The Labor Demand and Labor Supply Channels of Monetary Policy

Sebastian Graves[1], Christopher Huckfeldt[2], and Eric Swanson[3]

[1]University of Cambridge
[2]Federal Reserve Board
[3]UC Irvine & NBER

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UPenn

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- Study response of labor market flows to identified monetary policy shocks
  - Estimate impulse responses from proxy SVAR with HFI monetary policy shocks à la Gertler and Karadi (2015)
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- Apply standard accounting framework: Response of employment twice as large holding supply-driven flows fixed

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- Estimate key parameters to match response of labor market flows to "monetary policy shock"
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- Estimate key parameters to match response of labor market flows to "monetary policy shock"
  - Study by feeding in responses for layoff rate, job-finding rate, interest rate and wages
- Model achieves close fit for aggregate labor market flows
  - Also consistent with micro evidence on MPCs and MPEs
- Model implies quantitatively important labor supply response:
  Fix labor supply policy functions at steady-state, employment falls $\approx 80\%$ more
- Use model to explore mechanisms and role for heterogeneity

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    - See Christiano (2011), Galí, Smets, and Wouters (2012), Huo and Ríos-Rull (2020)
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▸ Related Literature

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- Particular focus on response of supply-driven flows to monetary policy
  - Decision to search from non-employment, e.g. U-to-N and N-to-U
  - Quits to unemployment and nonparticipation (new!)

▸ Time Series ▸ Cyclical Properties

Note: "Supply-driven" = worker-initiated decisions responding to prices and labor market conditions.

Decomposition of Flows From Employment to Non-Employment

- Previous work: E-to-U flows dominated by layoffs (Elsby et al. 2009, Ahn, 2023)

	Total	Quits	Layoffs	Other
mean(x)	0.014	0.002	0.008	0.004
std(x)/std(Y)	5.40	8.18	8.10	5.43
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- This paper: E-to-N flows show much larger role for quits

	Total	Quits	Layoffs	Other
mean(x)	0.029	0.012	0.003	0.015
std(x)/std(Y)	2.35	5.84	14.58	4.71
corr(x, Y)	0.47	0.51	−0.45	0.24

▸ Times Series of Decomposed E-to-U and E-to-N ▸ Relevance of Quit/Layoff Distinction ▸ Robustness of Decompositions

Estimating the Effects of Monetary Policy

- Begin with reduced-form VAR:

$$Y_t = \alpha + B(L)Y_{t-1} + u_t \tag{1}$$

- Seven monthly variables for baseline specification:
  - two-year Treasury yield, log CPI, log IP, corporate bond spreads
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- Assume structural shocks:

$$u_t = S\varepsilon_t \tag{2}$$

  where the first structural shock is a "monetary policy shock", ε_t^{mp}

- First column of S, denoted s_1, describes the impact effect of the structural monetary policy shock ε_t^{mp} on u_t and Y_t

- Use an external instrument z_t to identify s_1

External Instrument

- External instrument z_t needs to satisfy:

$$\mathbb{E}\left\{z_t \varepsilon_t^{mp}\right\} \neq 0 \qquad \text{(Relevance)}$$

$$\mathbb{E}\left\{z_t \varepsilon_t^{-mp}\right\} = 0 \qquad \text{(Exogeneity)}$$

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  - Use interest rate changes around FOMC announcements *and* Fed Chair speeches, orthogonalized with respect to recent macro/financial news
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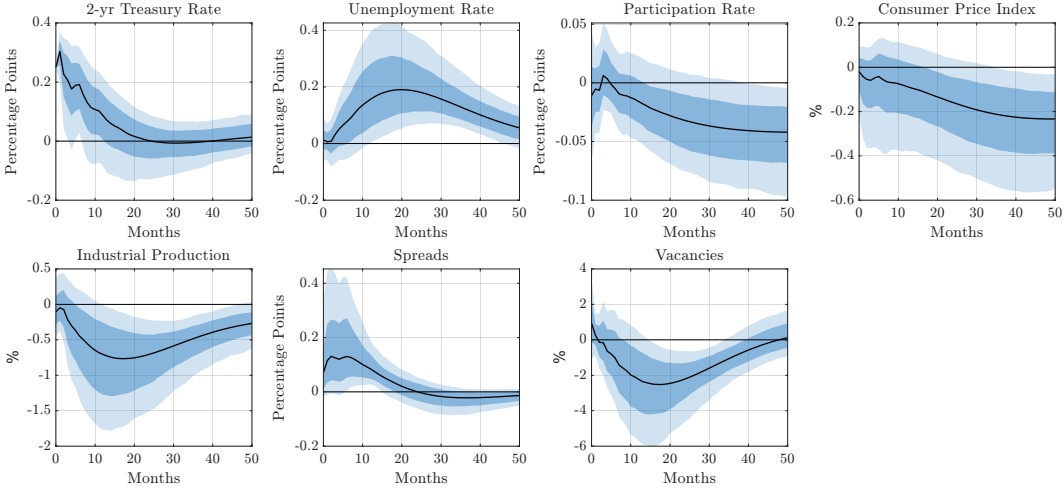
- Labor market flows added one-by-one to the main VAR
  - Similar results using large Bayesian VAR (or local projections)

Estimates

Baseline VAR

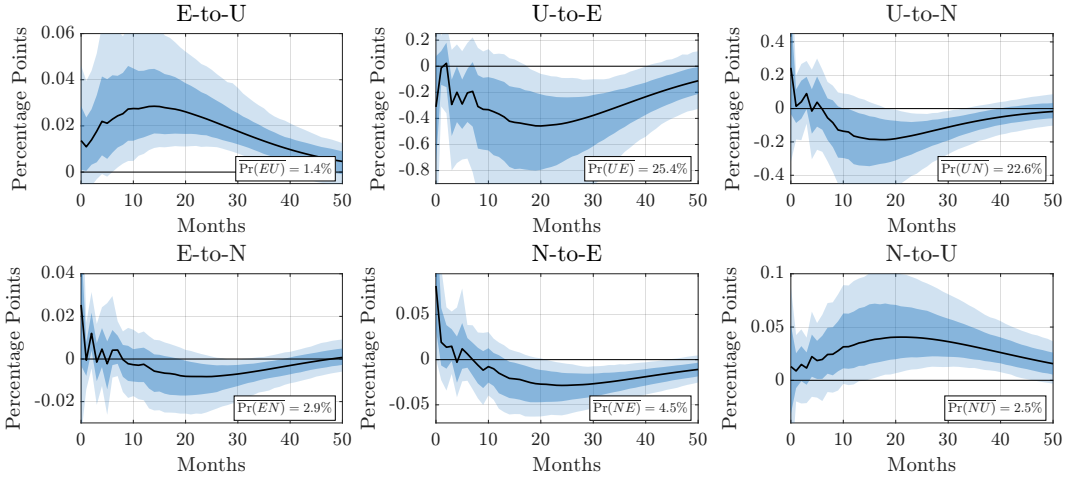


Robust F-statistic: 16.88

- Monthly data, 1978:M1–2019:M12
- Dark and light shaded regions report **68%** and **90%** confidence intervals

▸ FOMC Announcements ▸ FOMC Announcements (Orthog.) ▸ Romer & Romer ▸ Aruoba & Drechsel ▸ Local Projections ▸ Bayesian VAR

Response of Labor Market Flows



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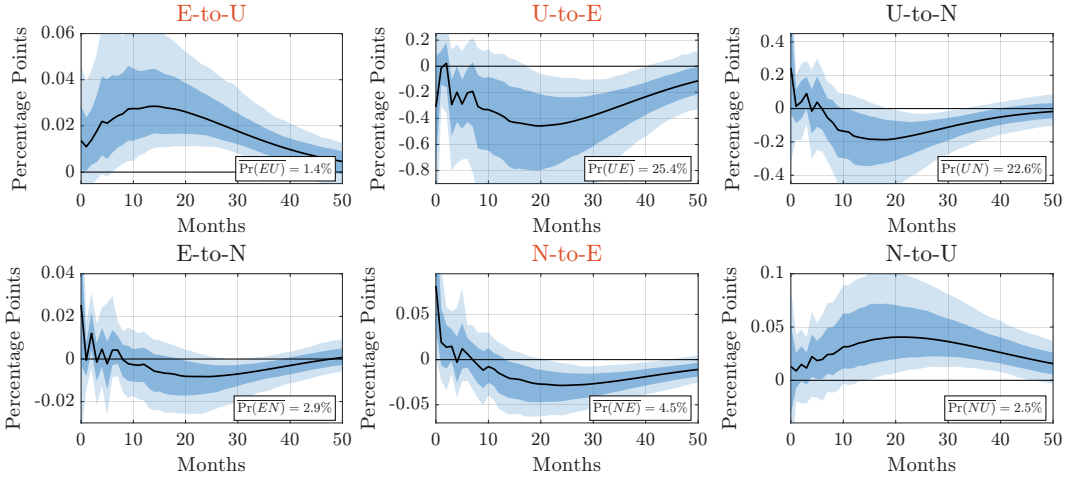

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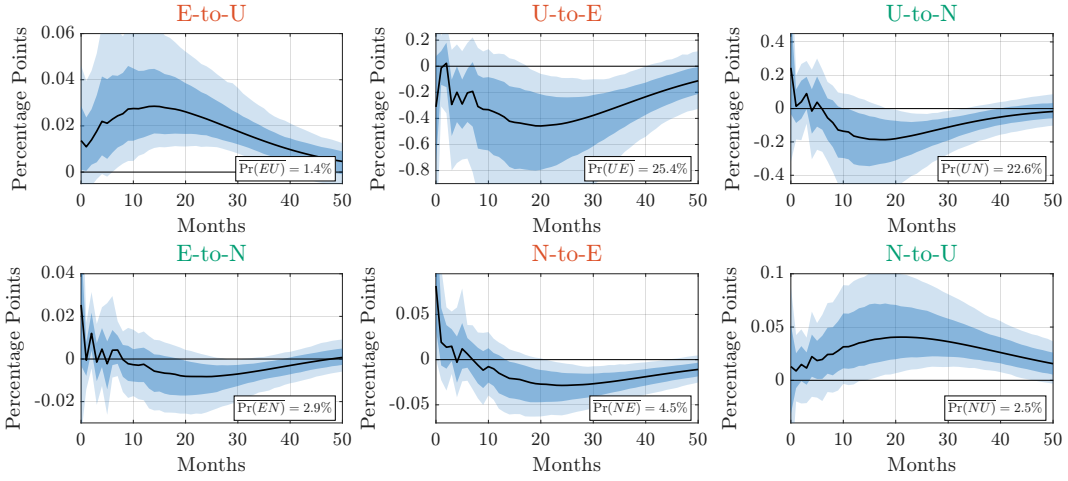

- pEU ↑, pUE ↓, & pNE ↓ ⇒ Consistent with narrative of decline in labor demand
- pNU ↑, pUN ↓, & pEN ↓ (via quits) ⇒ Consistent with increase in labor supply

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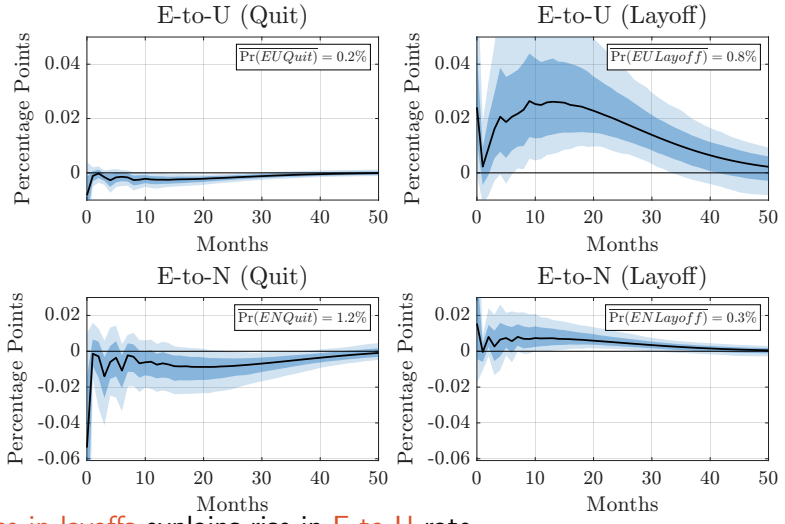
Response of E-to-U & E-to-N Flows: Quits vs Layoffs



- Increase in layoffs explains rise in E-to-U rate
- Decline in quits explains fall in E-to-N rate

▸ Including "Other" ▸ FOMC Announcements ▸ FOMC Announcements (Orthog.) ▸ Romer & Romer ▸ Aruoba & Drechsel ▸ LP

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6. Nominal wages decline slowly
7. Qualitatively similar co-movement of supply-driven flows in response to "Main Business Cycle Shock" à la Angeletos et al (2020)

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   - Local projections

Using Flows to Account for Dynamics of Labor Market Stocks

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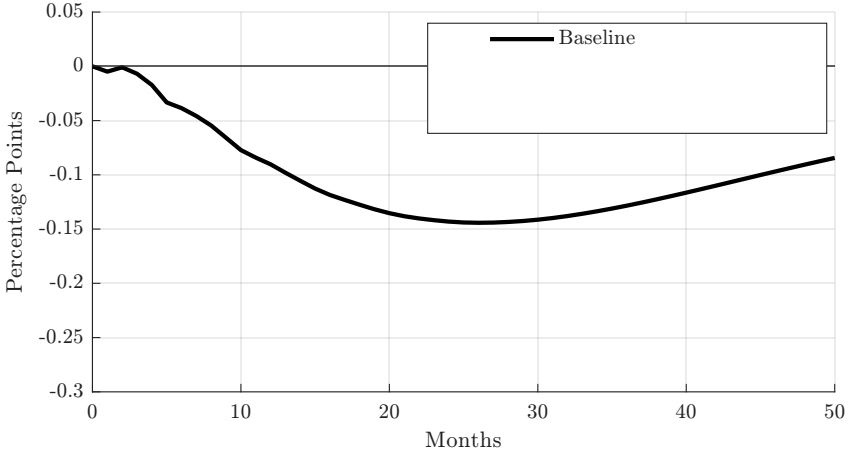
- Repeat for all supply-driven flows, in various combinations

▸ Ins and Outs of Employment ▸ Ins and Outs of Unemployment ▸ Ins and Outs of Participation

Decomposing Employment Response to a Monetary Policy Shock



- Employment falls almost 0.15 percentage points when all flows respond

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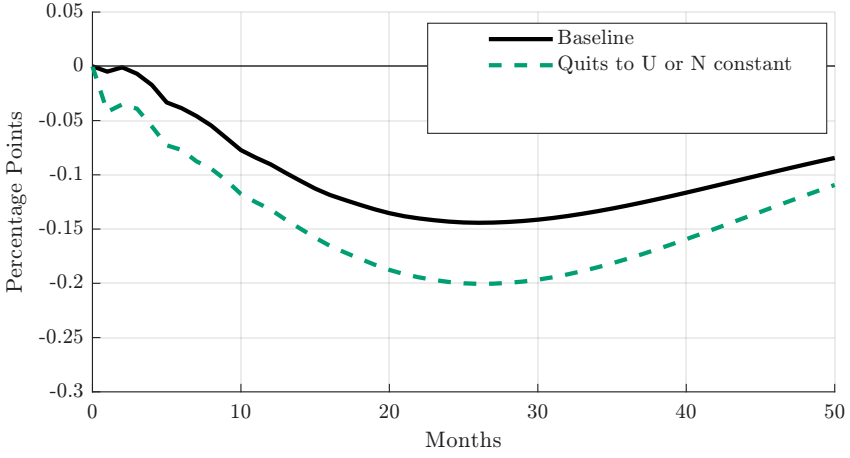

- Holding quit rate to U and N constant $\rightarrow$ employment falls 40% more

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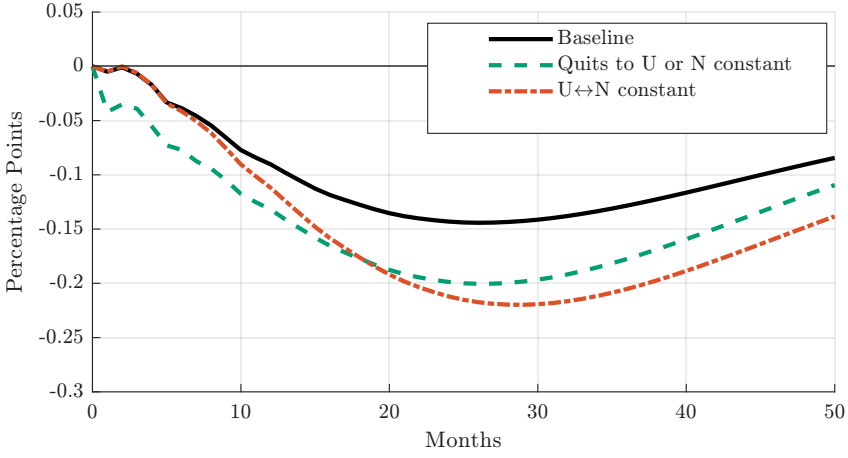

- Holding U-to-N and N-to-U rates constant → employment falls 60% more

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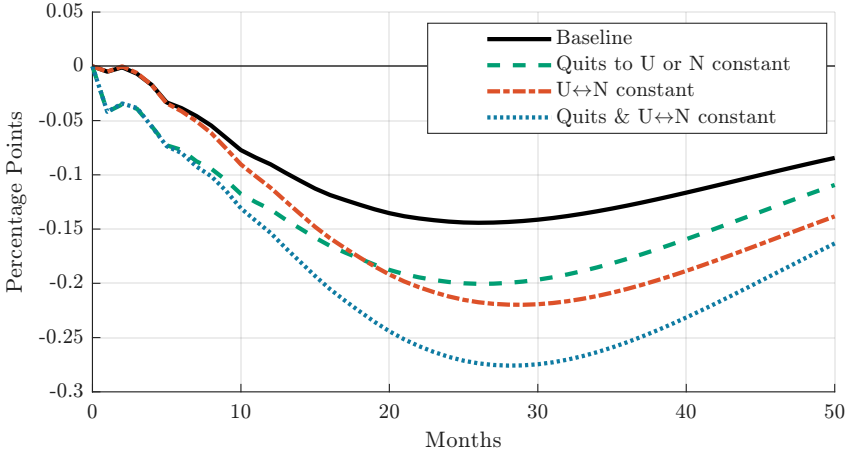

- Holding all supply-driven flows fixed ⇒ Employment falls twice as much

▸ Controls for composition ▸ Participation ▸ Unemployment ▸ Using Local Projections

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  - Households face employment risk (job-finding/layoff) + shocks to labor productivity
  - Choose consumption/savings and labor supply (quit, search, accept)
  - Partial equilibrium: feed in exact empirical paths for f_s, δ_L, R, w

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- Estimated model achieves close fit to labor market flows and stocks
  - Consistent with micro evidence on MPCs and MPEs
- Key findings:
  - Fix labor supply policy functions at steady state $\Rightarrow$ employment falls $\approx$ 80% more
  - Decline in job-finding rate is the key driver of shift in policy functions
  - Effect concentrated among low-productivity workers $\leftrightarrow$ low-education in data

Value Functions

Let $V_E(a, z)$, $V_{UI}(a, z, \kappa)$, and $V_{NoUI}(a, z, \kappa)$ represent the values of being employed, UI-eligible non-employed, and UI-ineligible non-employed:

Defined over

- a = assets
- z = idiosyncratic productivity: $\log z' = \rho_z \log z + \varepsilon_z$, $\varepsilon_z \sim N(0, \sigma_z^2)$
- κ = cost of job search, iid from logistic distribution: mean $= \mu_\kappa$, scale $= \sigma_\kappa$

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$$V_E(a,z) = \max_{c,a'} \Bigg\{ u(c) + \beta \max \{ \underbrace{\mathbb{E}\, V_{NoUI}(a',z',\kappa')}_{\text{Quit}}, \underbrace{\mathbb{E}\left[\delta_L V_{UI}(a',z',\kappa') + (1-\delta_L) V_E(a',z')\right]}_{\text{Do Not Quit}} \} \Bigg\}$$

subject to

$$c + a' = Ra + (1-\tau)wz + T, \quad a' \geq 0$$

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$$V_{UI}(a,z,\kappa) = \max_{c,a'}\left\{ u(c) + \max\left\{ \underbrace{(1-\kappa)\psi + \beta\mathcal{V}^{s}_{UI}(a',z)}_{\text{Search}}, \underbrace{\psi + \beta\mathcal{V}^{ns}_{UI}(a',z)}_{\text{Do Not Search}} \right\} \right\}$$

subject to

$$c + a' = Ra + (1-\tau)\min\{\phi w z, \bar{\phi}\} + T, \quad a' \geq 0$$

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where

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$$\mathcal{V}^{ns}_{UI}(a',z) = f_{ns} \cdot \max\{\mathbb{E}\, V_E(a',z'), \mathbb{E}\, V_{NoUI}(a',z',\kappa')\} + (1-f_{ns})\,\mathbb{E}\, V_{NoUI}(a',z',\kappa')$$

$$\tilde{V}_{UI}(a,z,\kappa) = \delta_{UI} V_{NoUI}(a,z,\kappa) + (1-\delta_{UI}) V_{UI}(a,z,\kappa).$$

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subject to

$$c + a' = Ra + T, \quad a' \geq 0$$

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▸ Timing

Estimation: A Monetary Policy Shock in the Model

- Feed in exact empirical impulse responses of job-finding rate, layoff rate, real interest rate and real wages
- Given these paths, response of labor market flows determined by shifts in labor supply policy functions vs. changes in distribution of households across states

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- Calibrate a number of parameters, $\theta_{EXT} \equiv \{\beta, \gamma, \bar{R}, \delta_{UI}, w, \alpha, \phi, \bar{\phi}, \tau, T\}$
  - Assume $u(c) = \frac{c^{1-\gamma}-1}{1-\gamma}$, $f_{ns} = \alpha f_s$

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  - Assume $u(c) = \frac{c^{1-\gamma}-1}{1-\gamma}$, $f_{ns} = \alpha f_s$
- Estimate remaining parameters to match IRFs of labor market flows
  - À la Christiano, Eichenbaum, Evans (2005) or Auclert, Rognlie, Straub (2020)

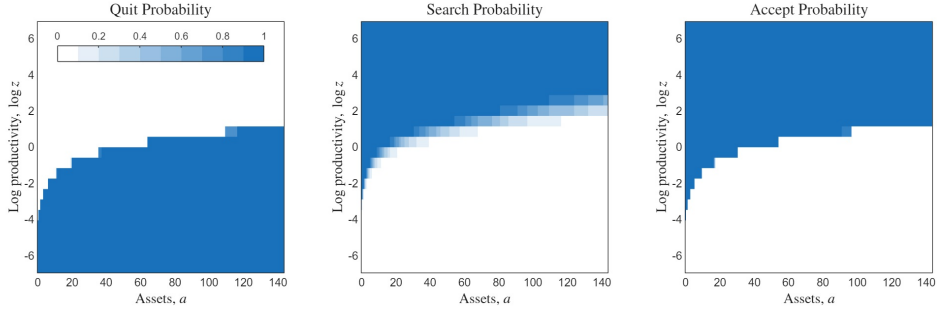
$$\theta_{EST} \equiv \{\rho_z, \sigma_z, \mu_\kappa, \sigma_\kappa, \psi, \delta_L, f_s\}$$

$$\hat{J} = \{EU_t, EN_t, UE_t, UN_t, NE_t, NU_t\}_{t=0}^{50}$$

$$\hat{\theta}_{EST} = \arg\min_{\theta_{EST}} (J(\theta_{EST}) - \hat{J})' \Sigma^{-1} (J(\theta_{EST}) - \hat{J})$$

▸ Model parameters

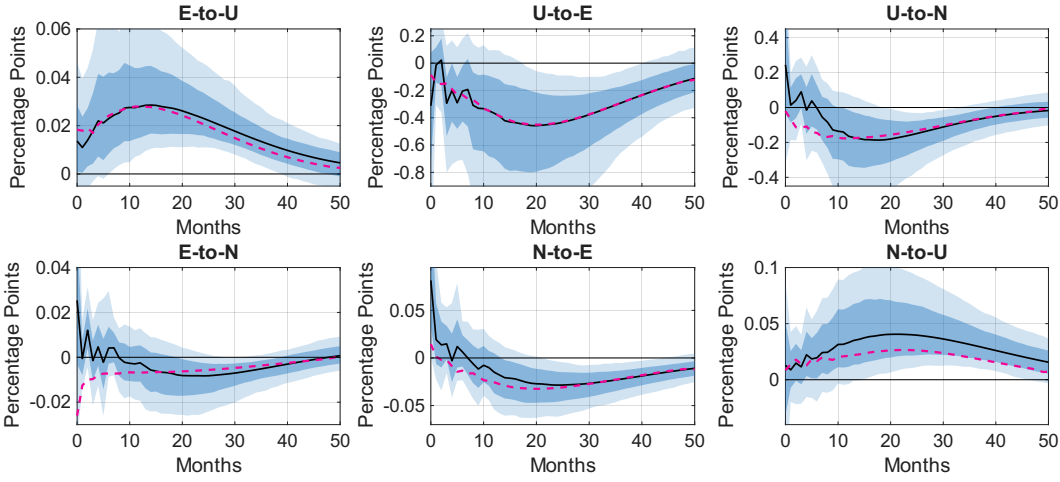
Results: Steady State



1. Model almost exactly fits steady-state transition rates between E, U and N
2. Model is consistent with recent evidence on MPCs and MPEs
   (Orchard et al. (2023), Boehm et al. (2024), Golosov et al. (2023))

MPC/MPE Details

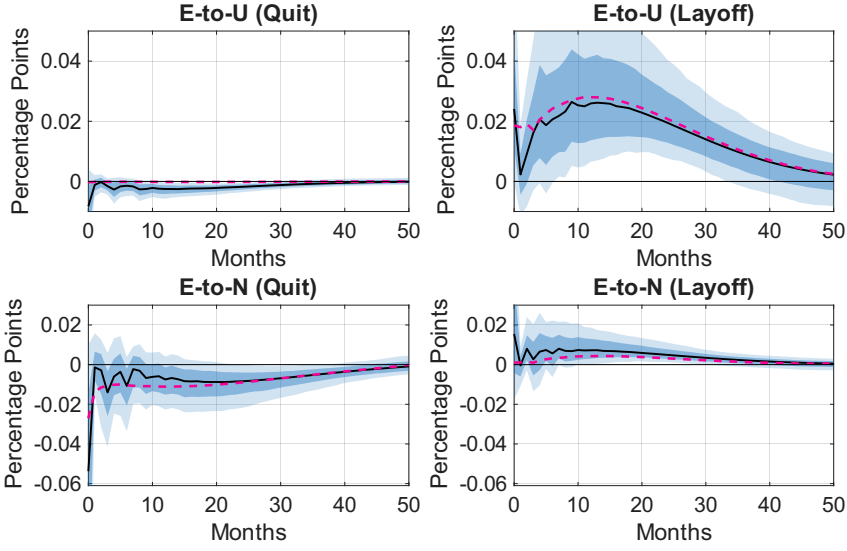
Response of Labor Market Flows: Model vs Data



- Labor market flows from model (magenta lines) largely fall within 68% CI's

Response of Labor Market Stocks

Response of Quits and Layoffs: Model vs Data



- Model also closely matches response of quits and layoffs

Evaluating the Role of Labor Supply

- Response of supply-driven flows in the model reflects both:
  - Composition: changing distribution of workers across states
  - Labor supply: shifts in household policy functions (quit, search, accept)

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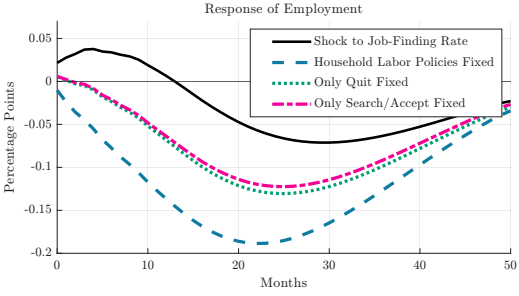
  - Greater mass of "likely searchers" in non-employment (composition), or
  - Higher propensity to search for employment (policy function shift)
- Two questions:
  1. What drives shifts in policy functions? Feed in components of shock one at a time
  2. How large is the overall role? Fix all policy functions at steady state, measure effect on employment

Decomposition: What is labor supply responding to?

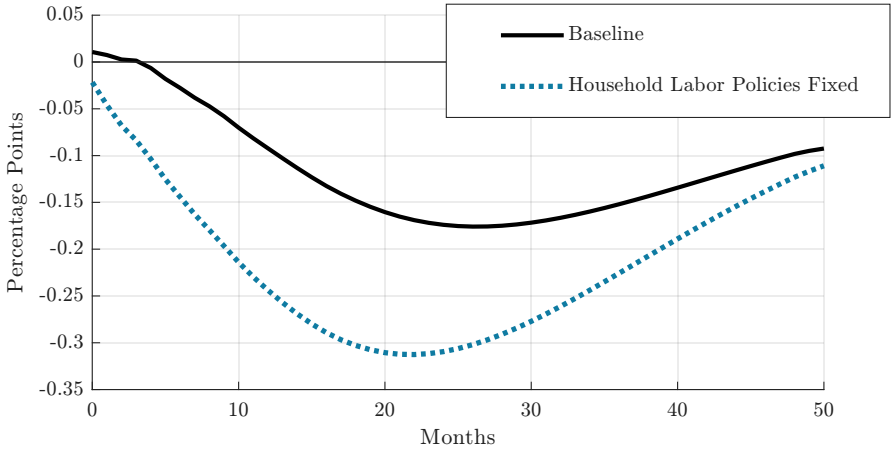
- Our "monetary policy shock" consists of paths for job-finding rate, layoff rate, real interest rate and real wages
- Feed in each component one at a time:



- Shift in labor supply policies driven by fall in job-finding rate, not layoff rate
- Real interest rate and real wages have modest effects on employment (interest rate shifts distribution; wages shift policy functions, but small)

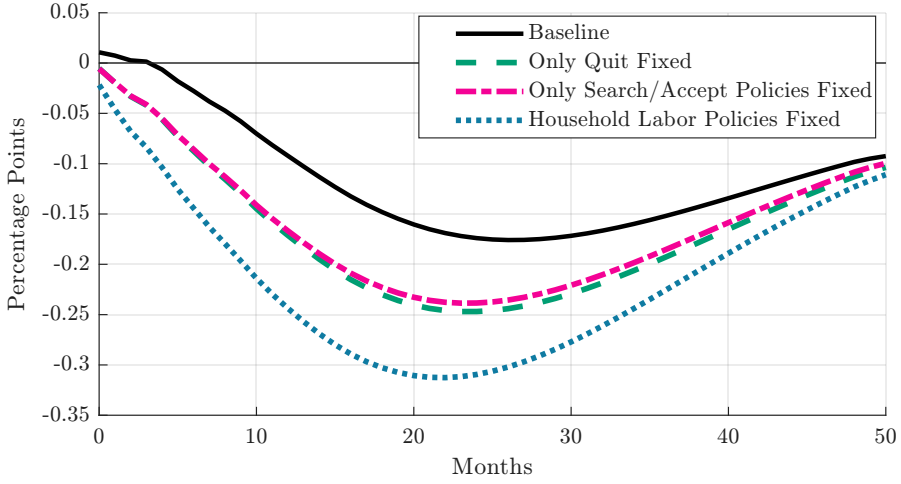
▸ Decomposed response of flows ▸ All four components

Labor Supply and the Employment Response



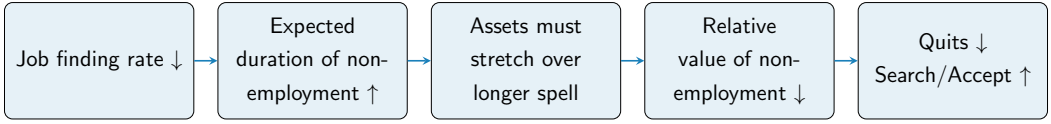
- Finding: Employment drops by additional $\approx 80\%$
  - Indicates broad-based increase in labor supply to contractionary monetary shock

Labor Supply and the Employment Response



- Finding: Employment drops by additional $\approx 80\%$
  - Indicates broad-based increase in labor supply to contractionary monetary shock
  - Shift in labor supply of employed and non-employed is equally important

Mechanism: Why does labor supply respond to the job finding rate?



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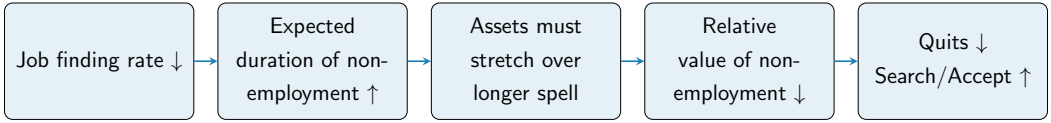

- *Marginal quitter* at median z: lowest wealth at which worker quits

	Wealth	Cons. drop if quits (%)
Steady state	62.03	1.50
After shock (same worker)	62.03	1.65
After shock (new marginal quitter)	62.25	1.57

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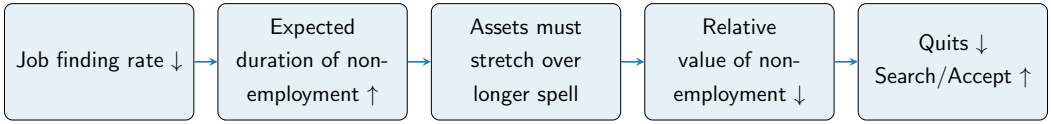

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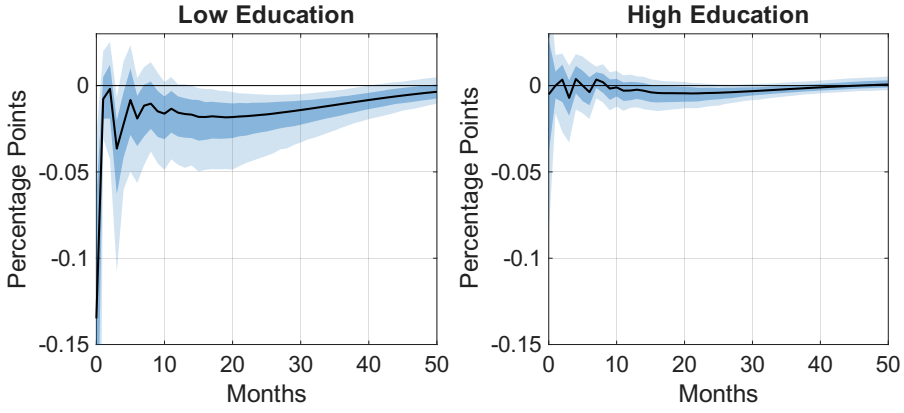
- Further, labor supply policy functions more responsive for low-z workers (closer to borrowing constraint) $\Rightarrow$ links to education heterogeneity in data

▸ Marginal quitter ▸ All margins by productivity

Mechanism: Whose labor supply is responding?

- Data: Decline in quits to N is concentrated among less educated



Steady-State Flows

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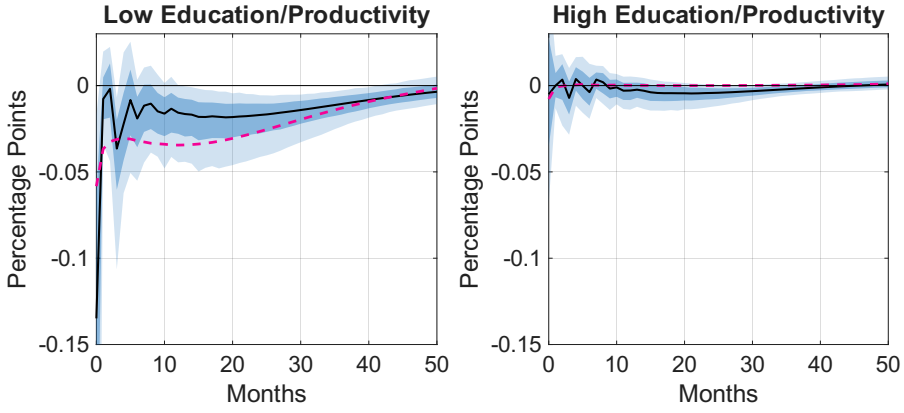
- Model: Decline in quits to N is concentrated among less productive



Steady-State Flows

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  - Driven by decline in job-finding rate: raises wealth threshold for quitting
  - Effect concentrated among low-productivity workers $\leftrightarrow$ low-education in data
- Labor supply is a quantitatively important channel in monetary transmission
  - Potentially relevant for understanding labor market effects of fiscal transfers

Appendix

Cyclical Properties of Labor Market Stocks and Flows

Cyclicality of Labor Market Stocks

	Employment-Population Ratio	Unemployment Rate	Participation Rate
mean(x)	61.14	6.19	65.16
std(x)/std(Y)	0.72	8.25	0.23
corr(x, Y)	0.83	−0.85	0.35

Note: x denotes the variable in each column, Y denotes HP-filtered log real GDP. Standard deviations and correlations are computed for HP-filtered quarterly averages. The sample is 1978-2019.

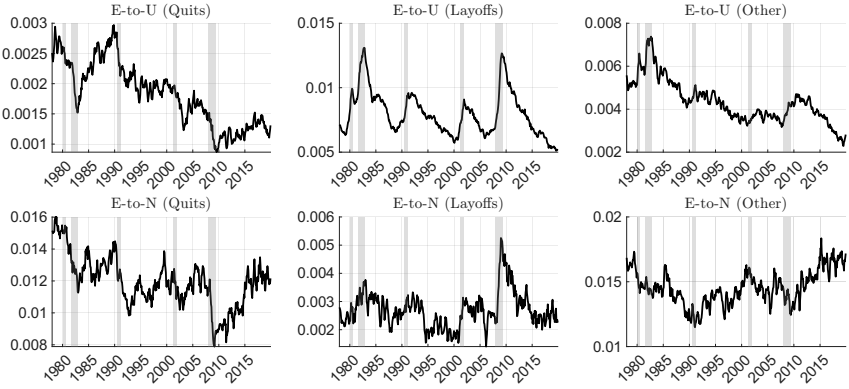
Cyclicality of Labor Market Flows

	E-to-U	E-to-N	U-to-E	U-to-N	N-to-E	N-to-U
mean(x)	0.014	0.029	0.254	0.226	0.045	0.025
std(x)/std(Y)	5.40	2.35	5.74	4.15	2.84	5.13
corr(x, Y)	−0.81	0.47	0.77	0.70	0.66	−0.67

Note: x denotes the variable in each column, Y denotes HP-filtered log real GDP. Standard deviations and correlations are computed for HP-filtered quarterly averages. The sample is 1978-2019.

Back

Decomposition of EU Flows



Back

Relevance of Distinction Between Quits and Layoffs

Post-EU Transition Rates: Quits vs Layoffs

	To		
From	E	U	N
E – U(Quit)	0.448	0.399	0.153
E – U(Layoff)	0.426	0.468	0.106

Note: Transition rates are shown for individuals that are in their first month of unemployment following an employment spell, split by reason for unemployment.

Back

Relevance of Distinction Between Quits and Layoffs

Post-EN Report: Quits vs Layoffs

	Average Probability
Want Job | E-N(Quit)	0.210
Want Job | E-N(Layoff)	0.515
NE | Want Job	0.145
NE | Do Not Want Job	0.037
NU | Want Job	0.172
NU | Do Not Want Job	0.012

Note: The top section shows the probability that individuals want a job, split by the reason for leaving to nonparticipation. The bottom section shows the probabilities of moving to employment, split by whether or not nonparticipants report wanting a job.

Back

Robustness of Quit/Layoff Distinction

Sequences of Reasons for U among E-U-U Individuals

Sample period	P(Quit | Layoff)	P(Layoff | Quit)
pre-Redesign	0.039	0.208
post-Redesign	0.007	0.026

Note: The first row shows the probability of individuals switching their reason for unemployment from layoff to quit (in the first column), or from quit to layoff (in the second column), prior to the 1994 CPS redesign. The second row shows the same, but for the period following the redesign.

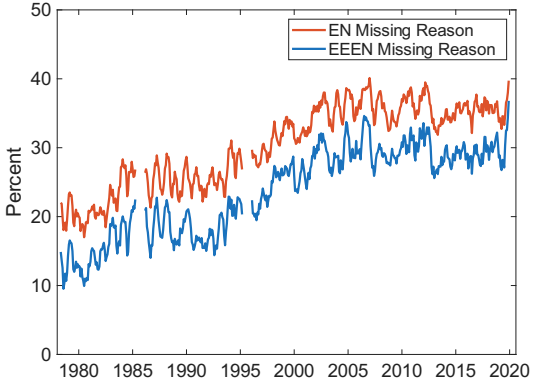
Transition Rates Across E-U-U Individuals

		To		
	From	E	U	N
(*a*)	E − U(Quit) − U(Layoff)	0.339	0.553	0.108
(*b*)	E − U(Quit) − U(Quit)	0.343	0.536	0.121
(*c*)	E − U(Layoff) − U(Quit)	0.352	0.557	0.091
(*d*)	E − U(Layoff) − U(Layoff)	0.264	0.667	0.068

Note: Transition rates are shown for individuals that are in their second month of unemployment following an employment spell, split by reason for unemployment. The rates are computed for the period prior to the 1994 CPS redesign.

Back

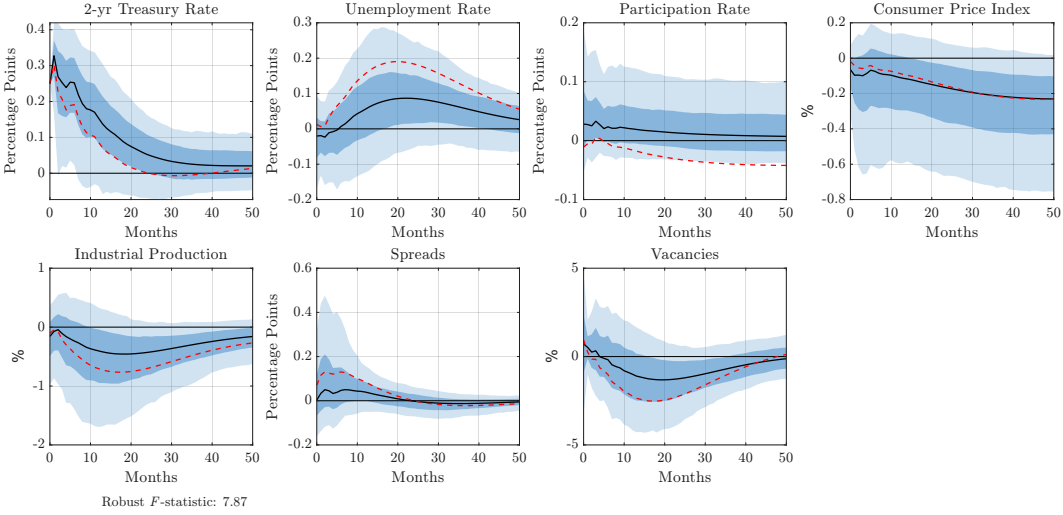
Fraction of EN Transitions with Missing Reason



Note: The red line shows the proportion of individuals making an EN transition for which there is missing data on the reason for leaving the last job. The blue line shows the same calculation for individuals that were employed in each of the first three months before moving to nonparticipation. Series are smoothed using a centered 5-month moving average.

Back

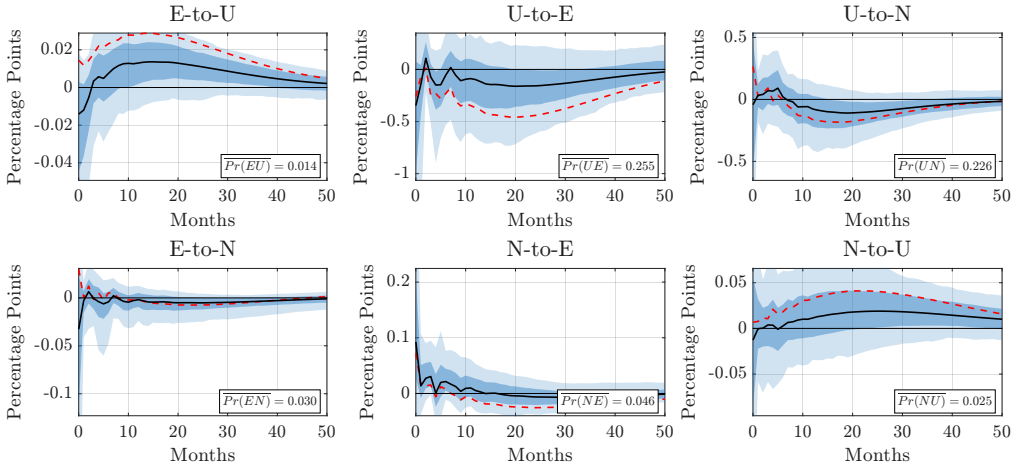
Baseline VAR: FOMC Announcement Shocks (Not Orthogonalized)



- Black/Blue: FOMC Announcement shocks, no orthogonalization
- Dashed Red: Our baseline estimates

Back

Labor Market Flows: FOMC Announcement Shocks (Not Orthogonalized)



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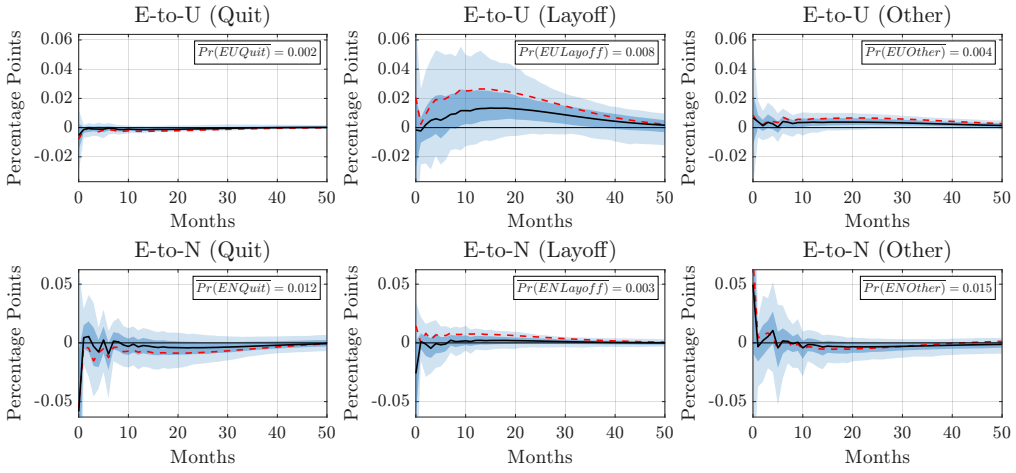
Back

Quit/Layoff Responses: FOMC Announcement Shocks (Not Orthog.)



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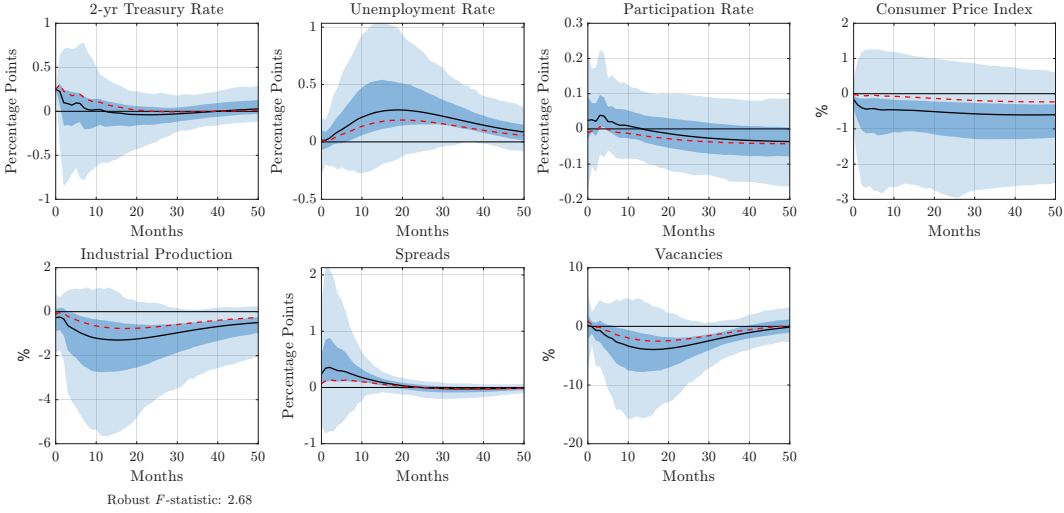
Back

Baseline VAR: FOMC Announcement Shocks (Orthogonalized)



- Black/Blue: FOMC Announcement shocks, orthogonalized
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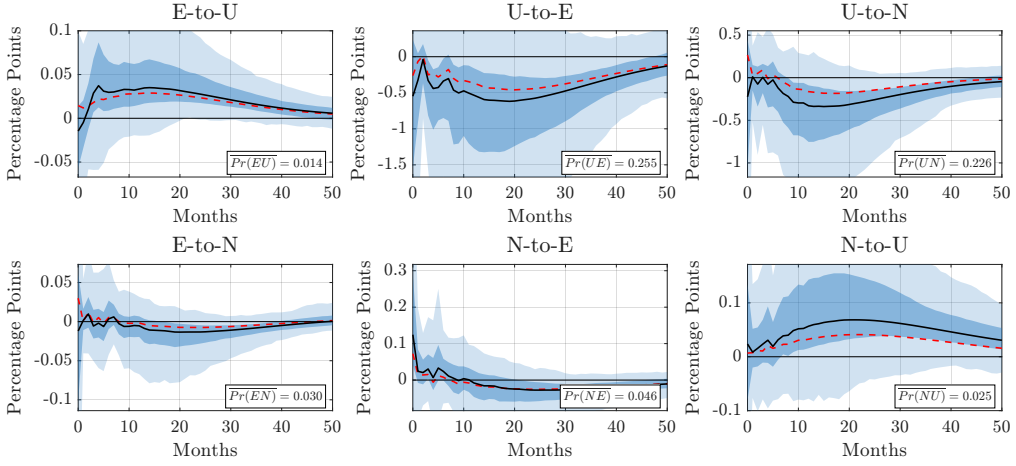
Back

Labor Market Flows: FOMC Announcement Shocks (Orthogonalized)



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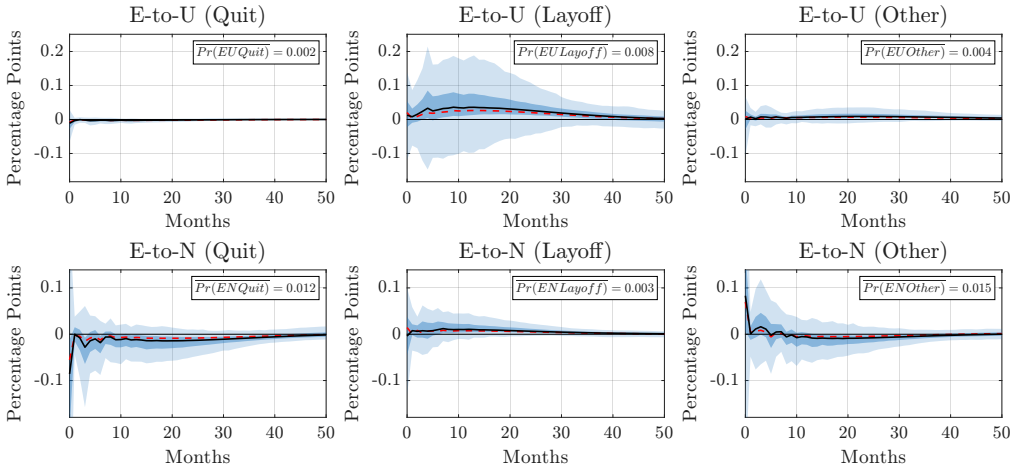

- Black/Blue: FOMC Announcement shocks, orthogonalized
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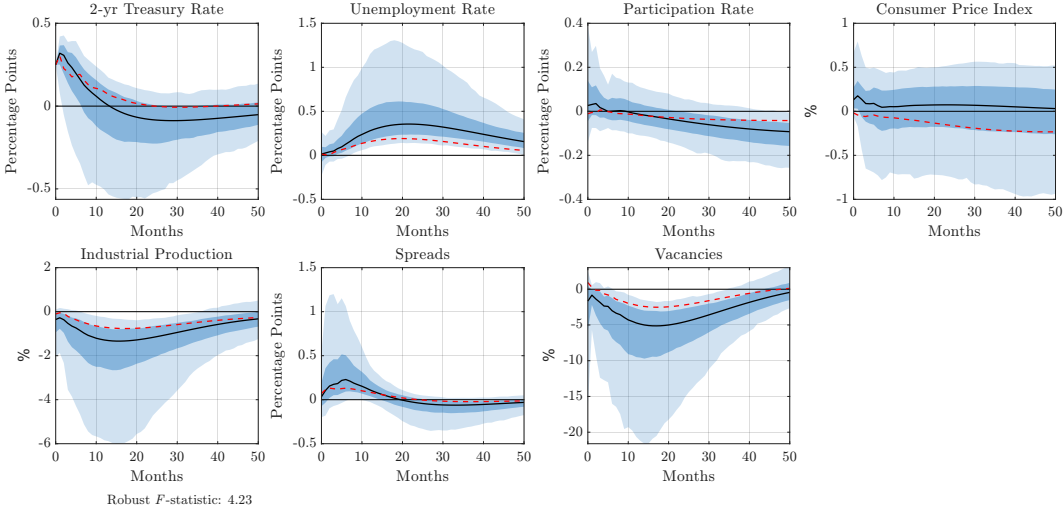
Back

Baseline VAR: Romer & Romer Shocks

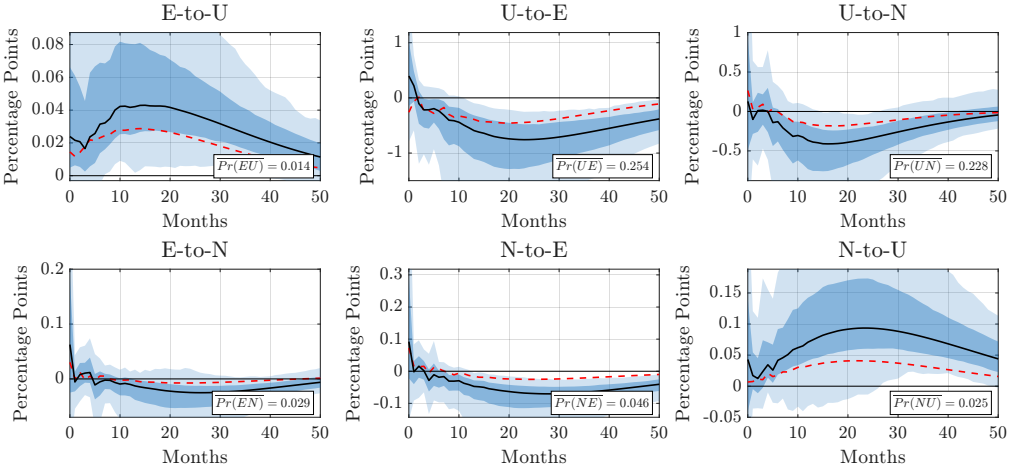


Robust F-statistic: 4.23

- Black/Blue: Updated Romer & Romer (2004) shocks, 1982:M10-2007:M12
- Dashed Red: Our baseline estimates

Back

Labor Market Flows: Romer & Romer Shocks



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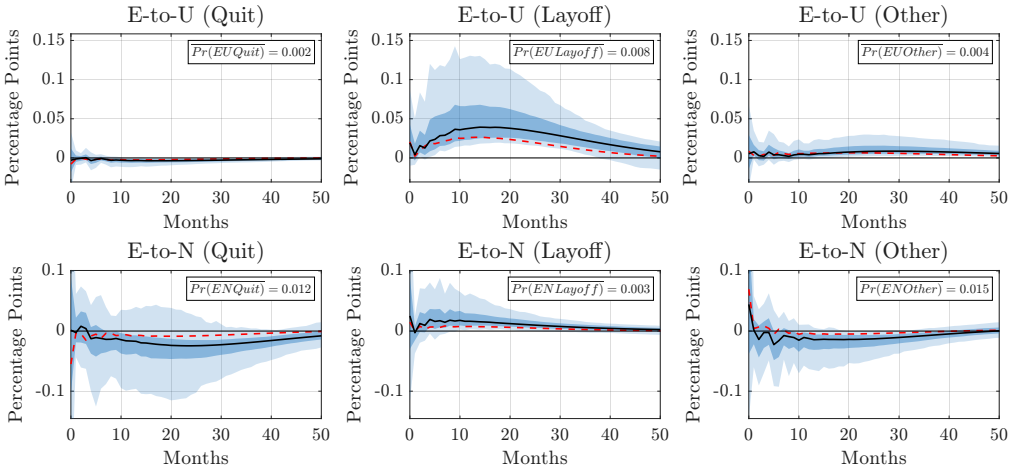

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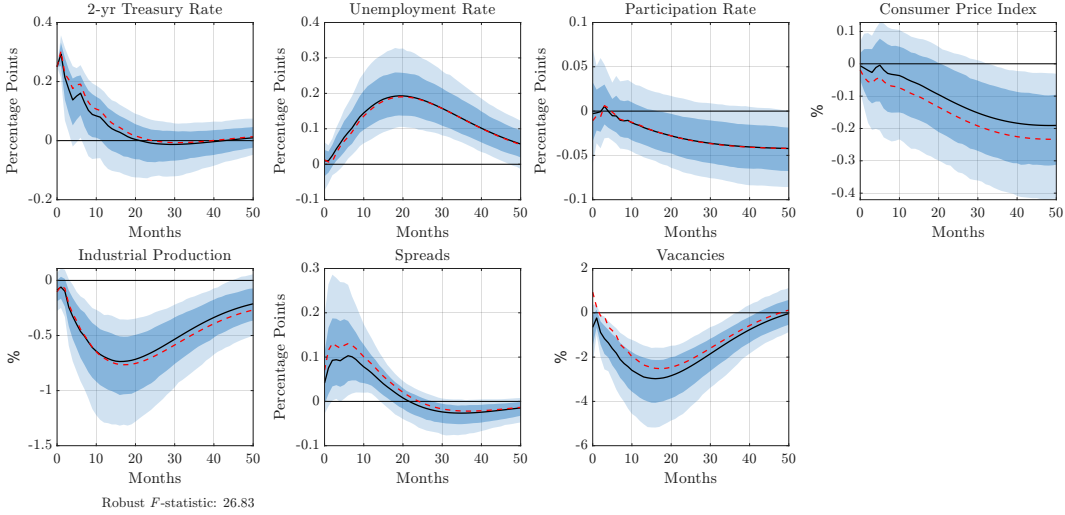
Back

Baseline VAR: Aruoba & Drechsel (2024) Shocks



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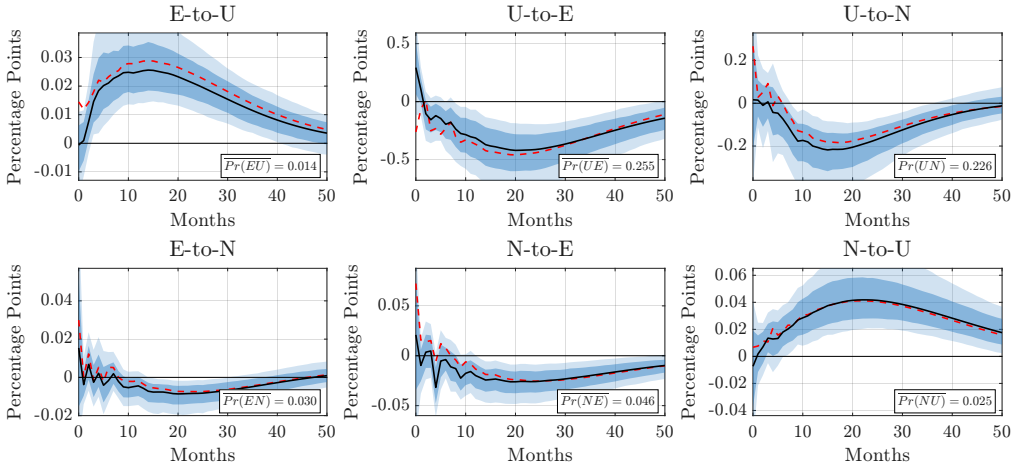
◂ Back (Main VAR) ◂ Back (Robustness)

Labor Market Flows: Aruoba & Drechsel (2024) Shocks



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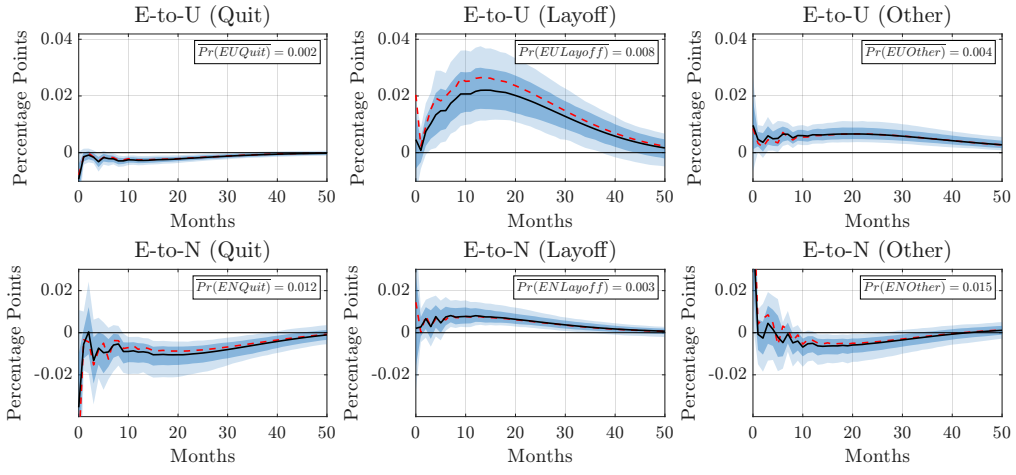
Quit/Layoff Responses: Aruoba & Drechsel (2024) Shocks



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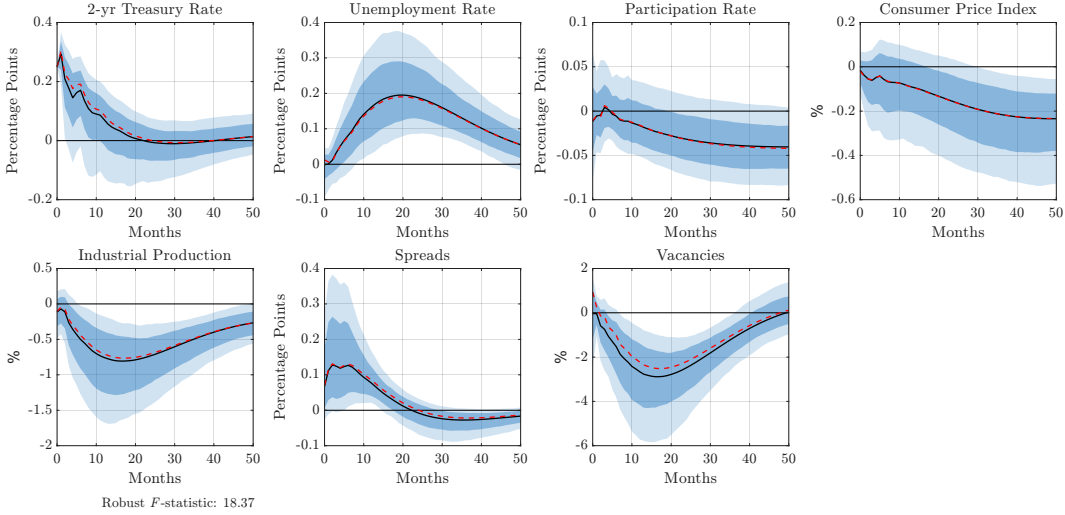
◂ Back (Flows Decomposition) ◂ Back (Robustness)

Baseline VAR: AD (2024) and SJ (2025) Shocks

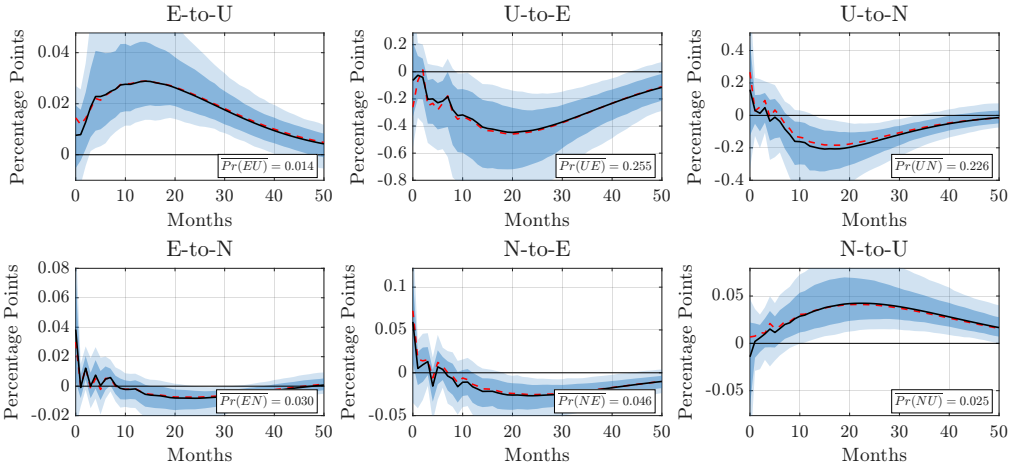


Robust F-statistic: 18.37

- Two instruments: AD (2024) and SJ (2025) shocks, 1988:M10-2008:M10
- Dashed Red: Our baseline estimates

Back

Labor Market Flows: AD (2024) and SJ (2025) Shocks

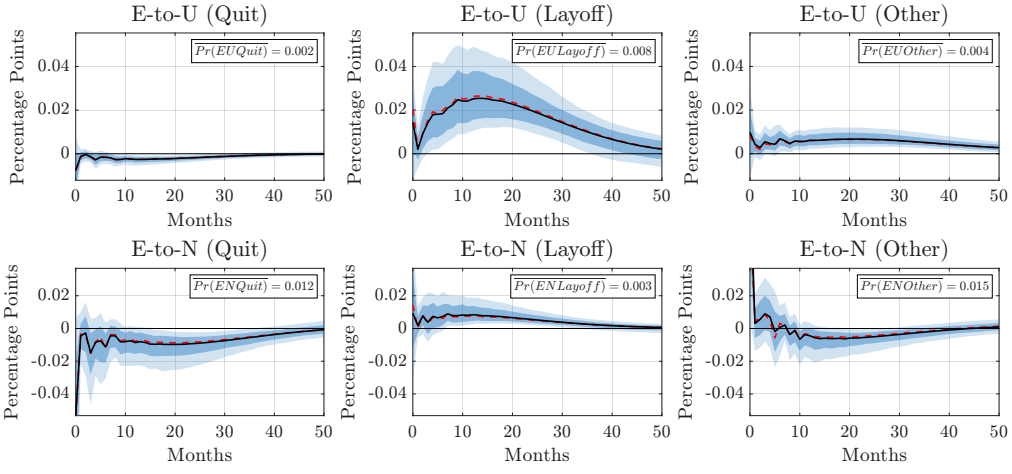


Robust F-statistic: 18.25

- Two instruments: AD (2024) and SJ (2025) shocks, 1988:M10-2008:M10
- Dashed Red: Our baseline estimates

Back

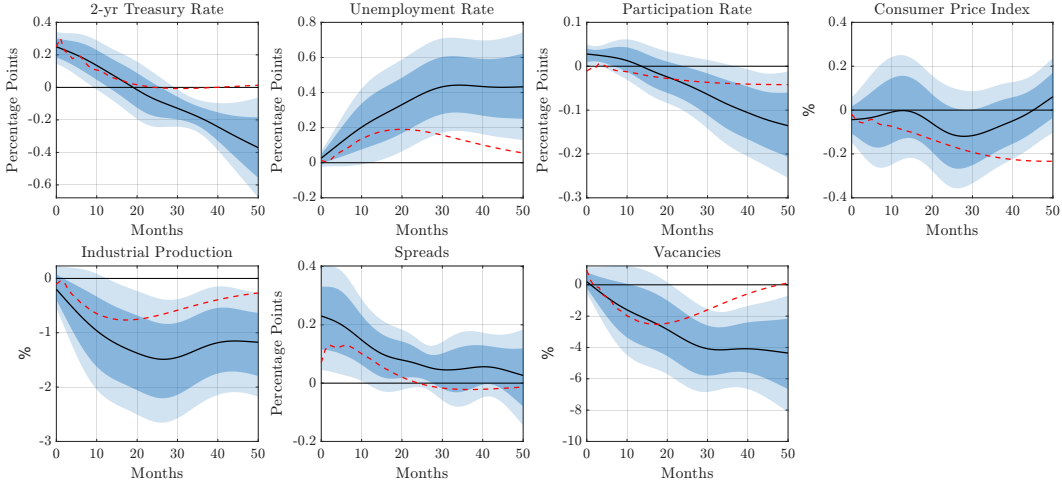
Quit/Layoff Responses: AD (2024) and SJ (2025) Shocks



- Two instruments: AD (2024) and SJ (2025) shocks, 1988:M10-2008:M10
- Dashed Red: Our baseline estimates

Back

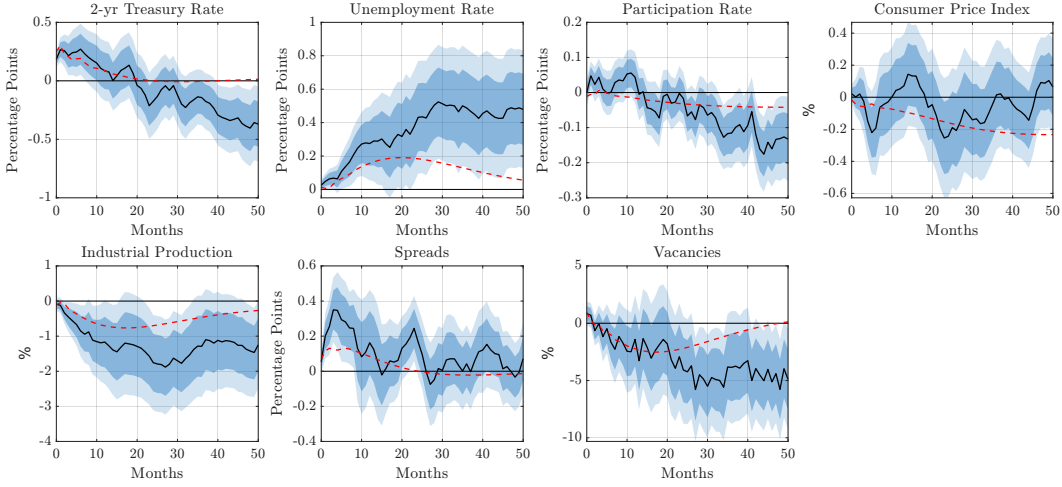
Baseline Variables: Local Projection Estimates



- Black/Blue: Smooth Local Projections (Barnichon & Brownlees (2019))
- Dashed Red: Our baseline estimates

◂ Back (Main VAR) ◂ Back (Robustness)

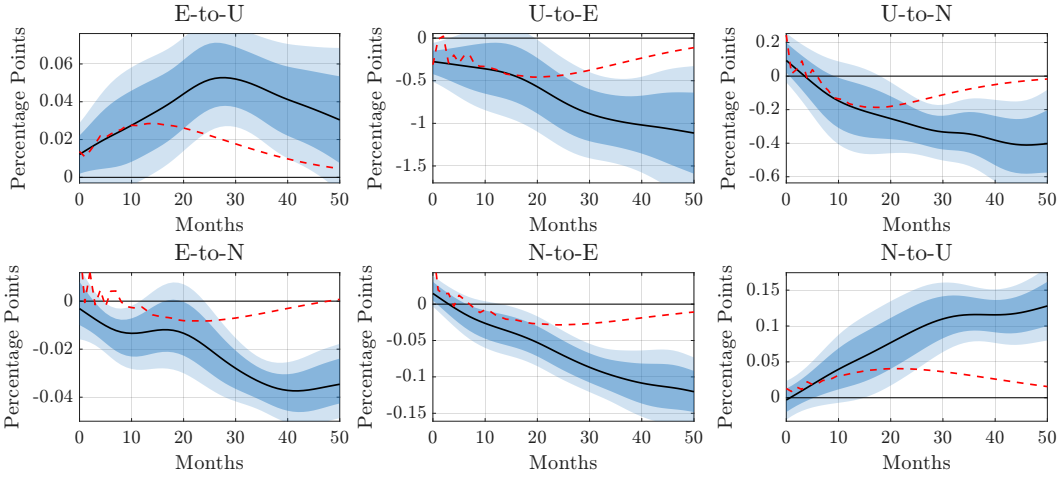
Baseline Variables: Local Projection Estimates



- Black/Blue: Standard Local Projections
- Dashed Red: Our baseline estimates

Back (Main VAR) Back (Robustness)

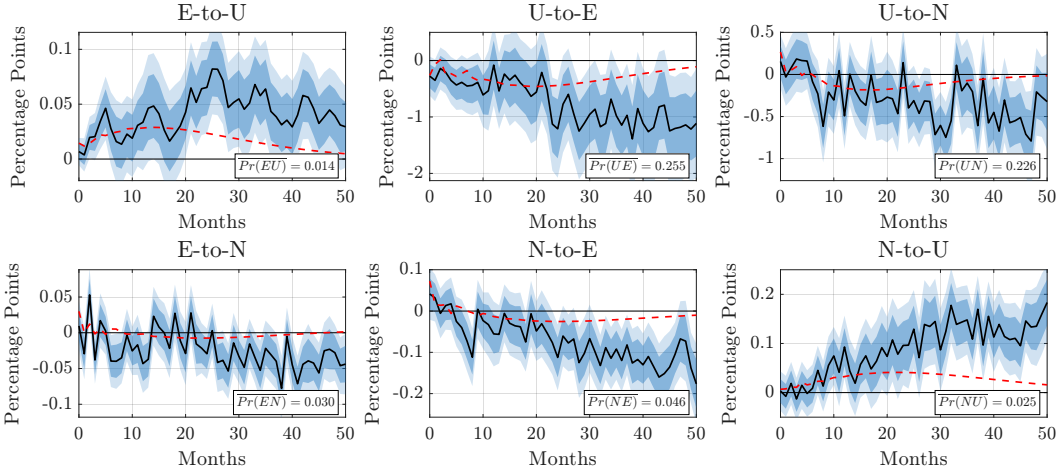
Labor Market Flows: Local Projection Estimates



- Black/Blue: Smooth Local Projections (Barnichon & Brownlees (2019))
- Dashed Red: Our baseline estimates

Back (Flows) Back (Robustness)

Labor Market Flows: Local Projection Estimates



- Black/Blue: Standard Local Projections
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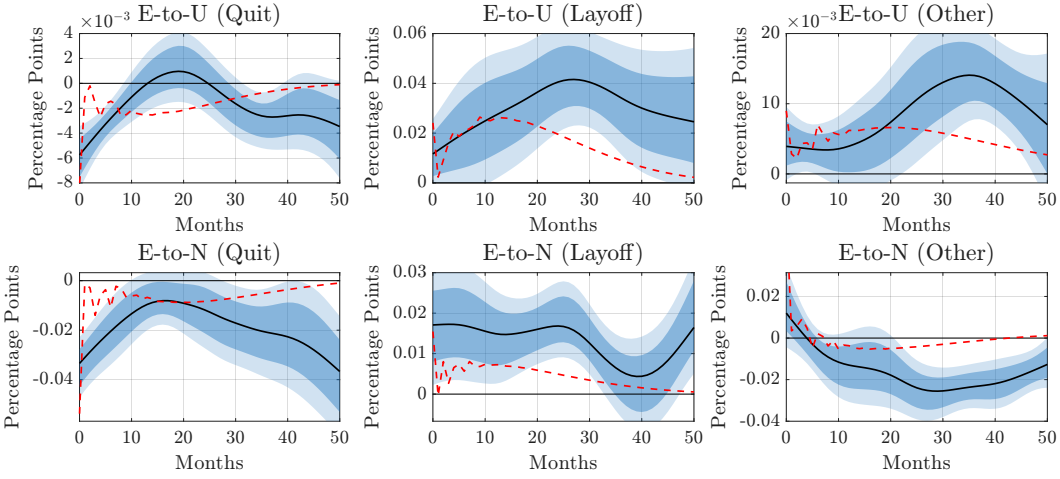
◂ Back (Flows) ◂ Back (Robustness)

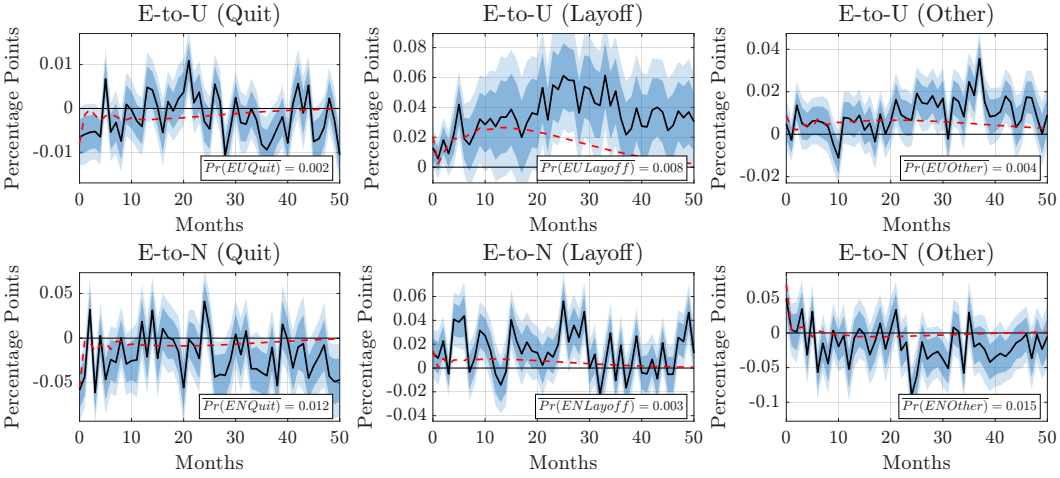
Quit/Layoff Responses: Local Projection Estimates



- Black/Blue: Smooth Local Projections (Barnichon & Brownlees (2019))
- Dashed Red: Our baseline estimates

◂ Back (Flows Decomposition) ◂ Back (Robustness)

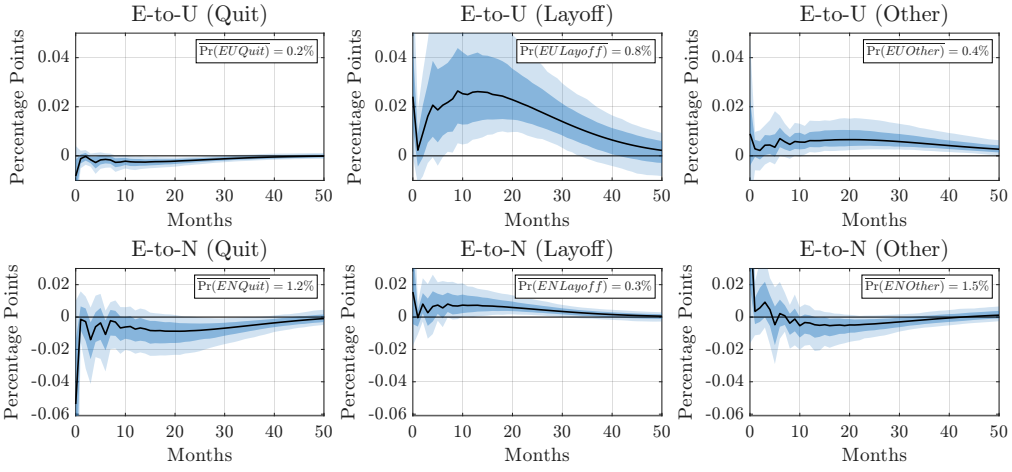
Quit/Layoff Responses: Local Projection Estimates



- Black/Blue: Standard Local Projections
- Dashed Red: Our baseline estimates

Back

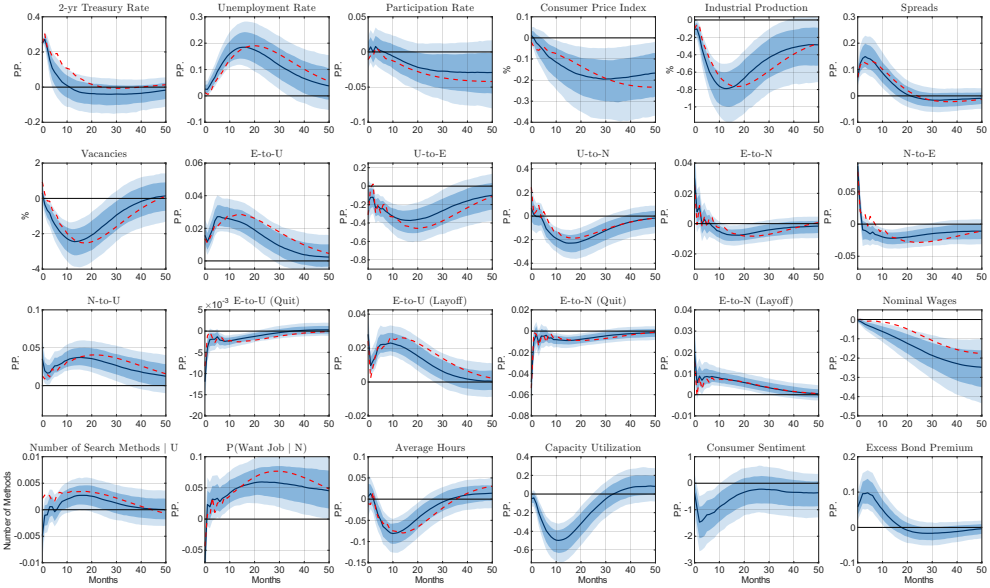
Quit/Layoff Responses: Including Other Separations



- "Other separations" not a key driver of EU or EN responses

Back

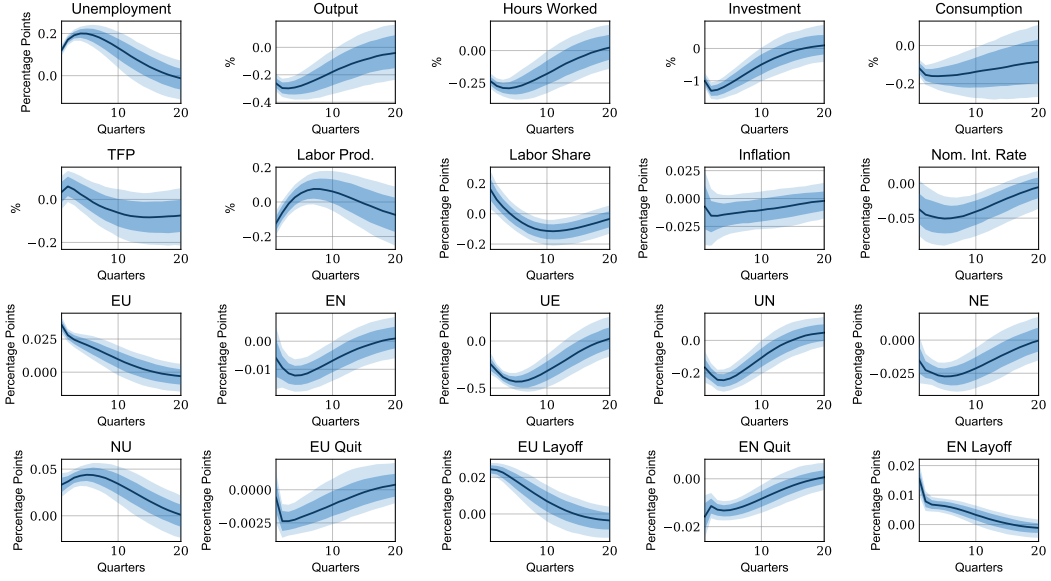
Large Scale Bayesian VAR



- Dashed Red: Our baseline estimates where available

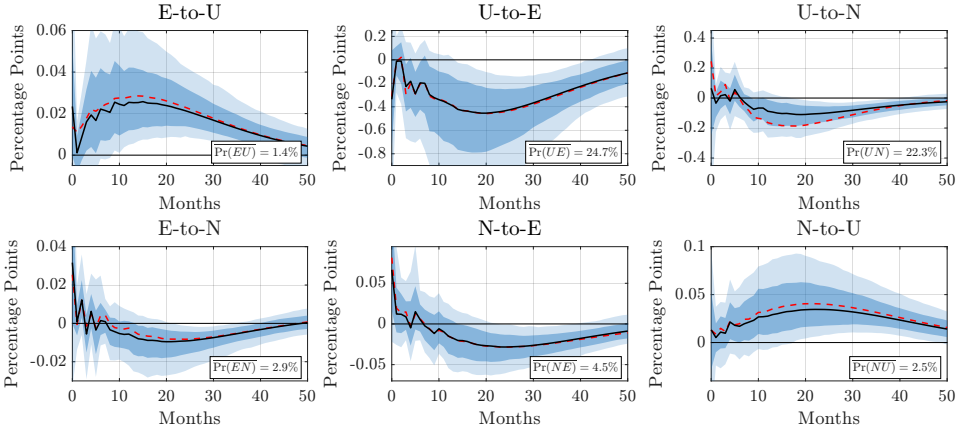
◂ Back (Main VAR) ◂ Back (Robustness)

Main Business Cycle Shock + Flows (Angeletos et al. (2020))



Back

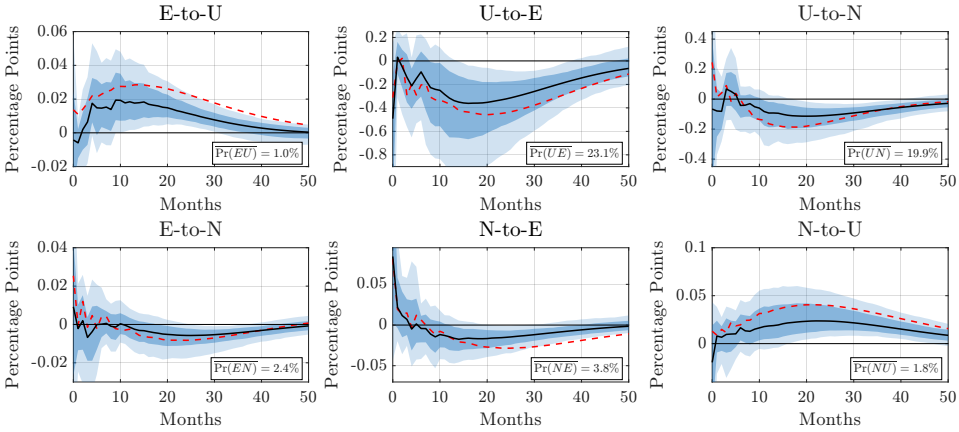
Labor Market Flows: Holding Composition Fixed



- Composition-adjusted flows by ex-ante characteristics, à la Elsby et al. (2015)
- Fix shares using bins for age × gender × education × reason for unemployment
- Dashed red lines report our baseline estimates

Back

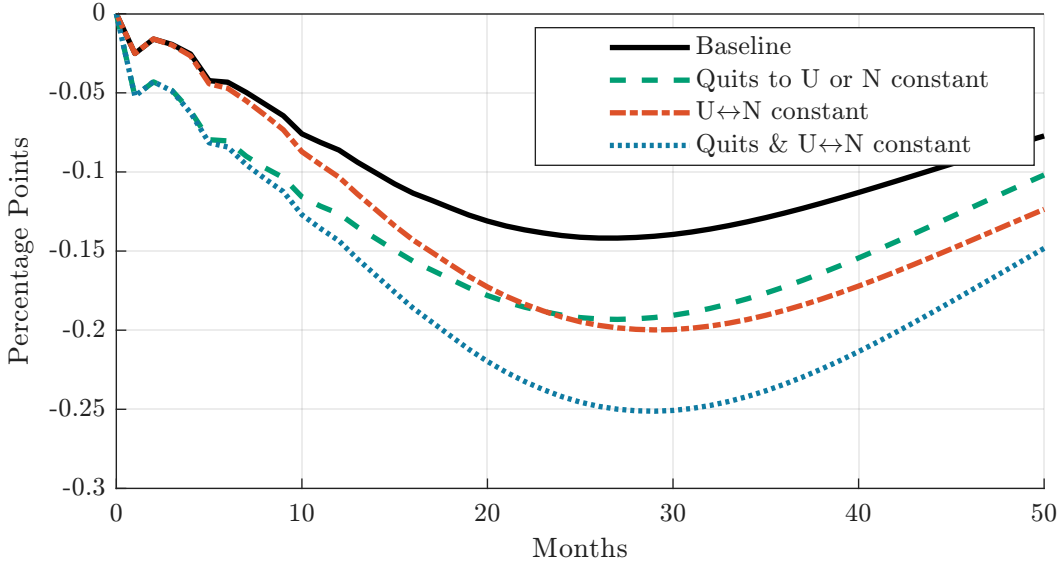
Labor Market Flows: Holding Composition Fixed (Full Controls)



- Fix shares using bins for age × gender × education × reason for unemployment × labor market status one year ago
- Dashed red lines are baseline estimates (different sample...)

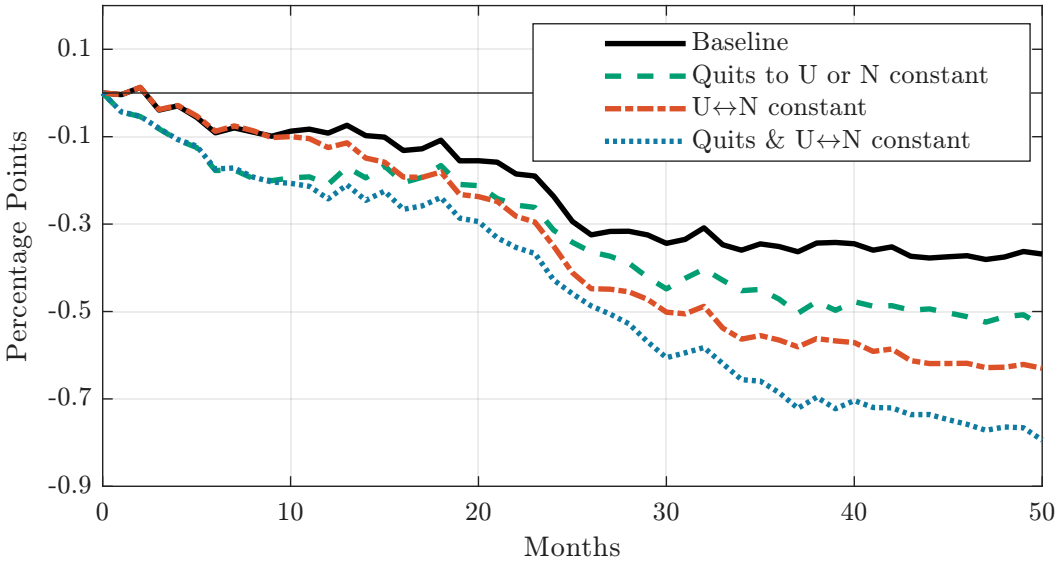
Back

Decomposing Employment Response: Holding Composition Fixed



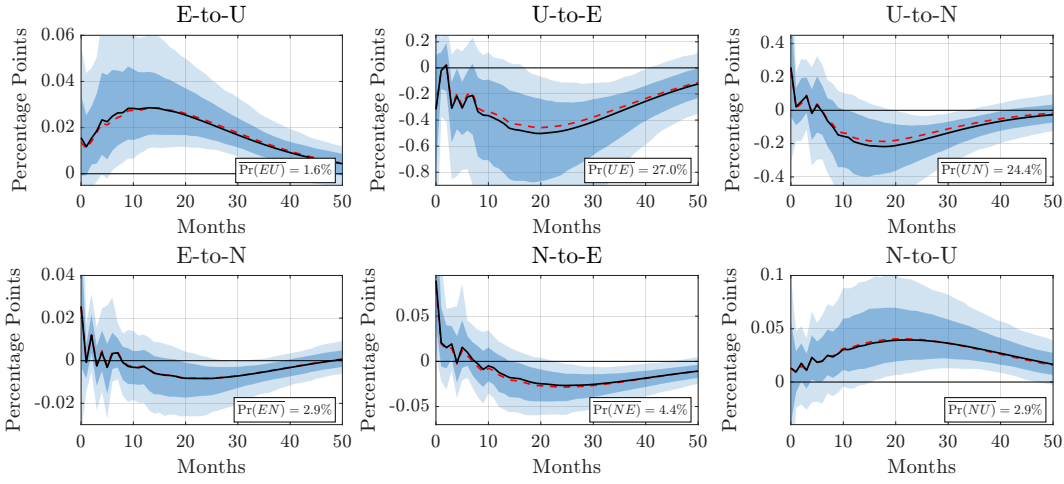
Back

Decomposing Employment Response: Using Local Projections



Back

Labor Market Flows: Corrected for Time-Aggregation



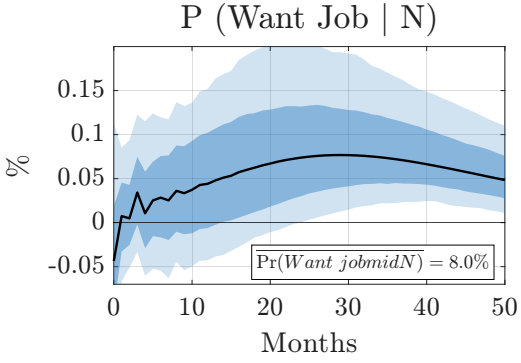
- Dashed Red: Our baseline estimates

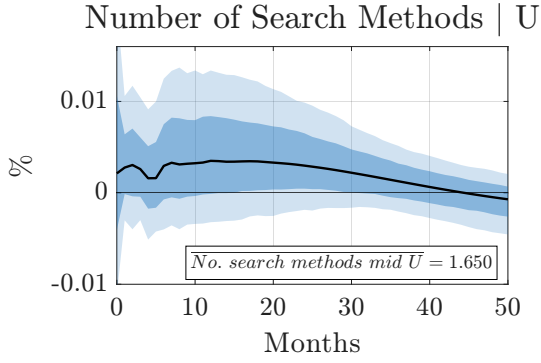
Back

Intensive Margins of Labor Supply

Intensive margins of job search consistent with behavior of NU/UN flows:

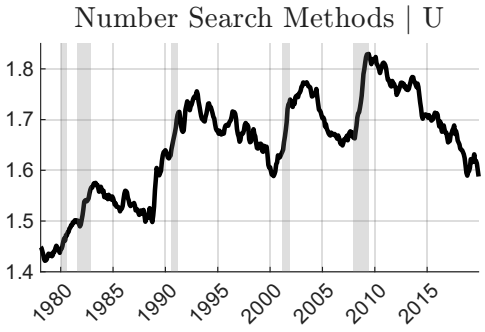
- For N: share that want a job
- For U: number of search methods

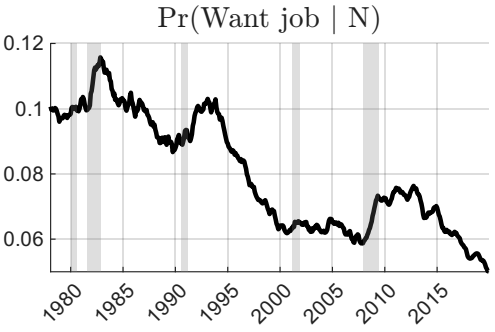




Back

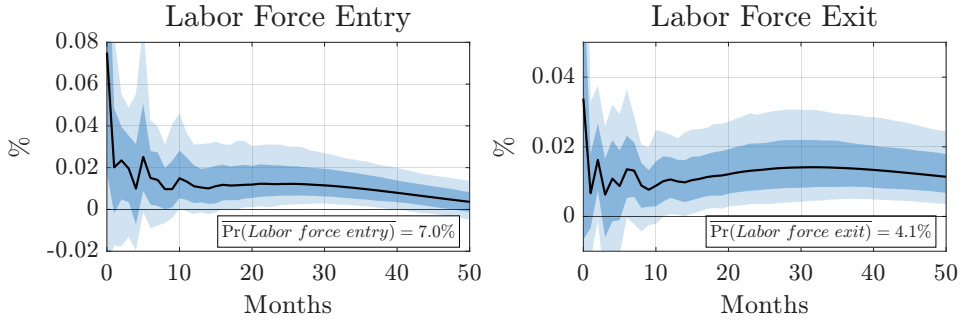
Intensive Margins: Time-Series





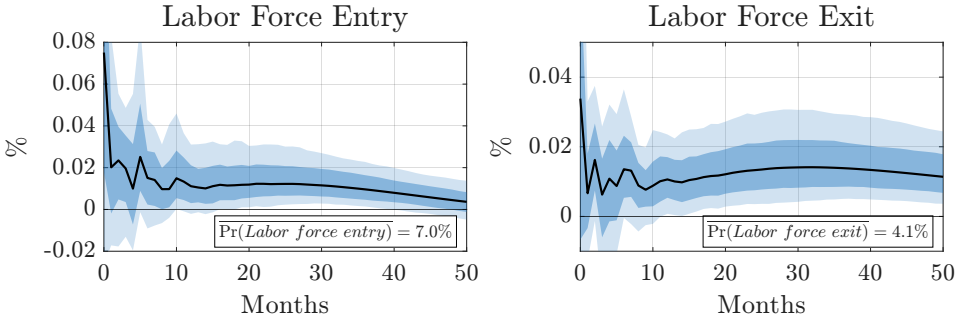
Back

Participation: Response of Labor Force Entry and Exit



- Participation falls due to higher exit rate, offset by rise in entry

Participation: Response of Labor Force Entry and Exit



- Participation falls due to higher exit rate, offset by rise in entry
- Increase in exits driven by u_{t-1}, attenuated by UN_t and EN_t

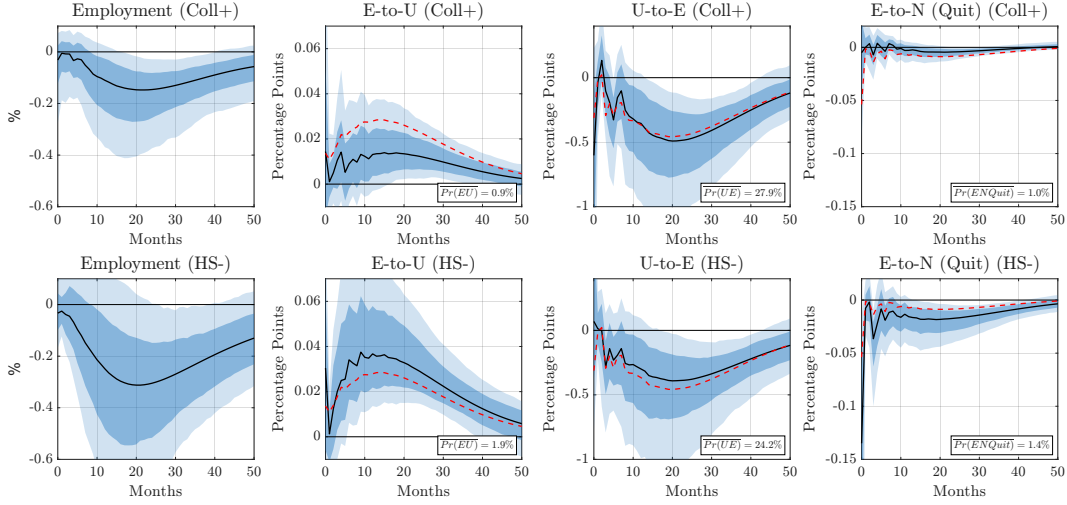
$$\left(\text{Labor Force Entry Rate}\right)_t = NU_t + NE_t,$$

$$\left(\text{Labor Force Exit Rate}\right)_t = u_{t-1} \cdot UN_t + (1 - u_{t-1}) \cdot EN_t,$$

where u_{t-1} denotes the unemployment rate (and $\overline{UN} >> \overline{EN}$)

Back

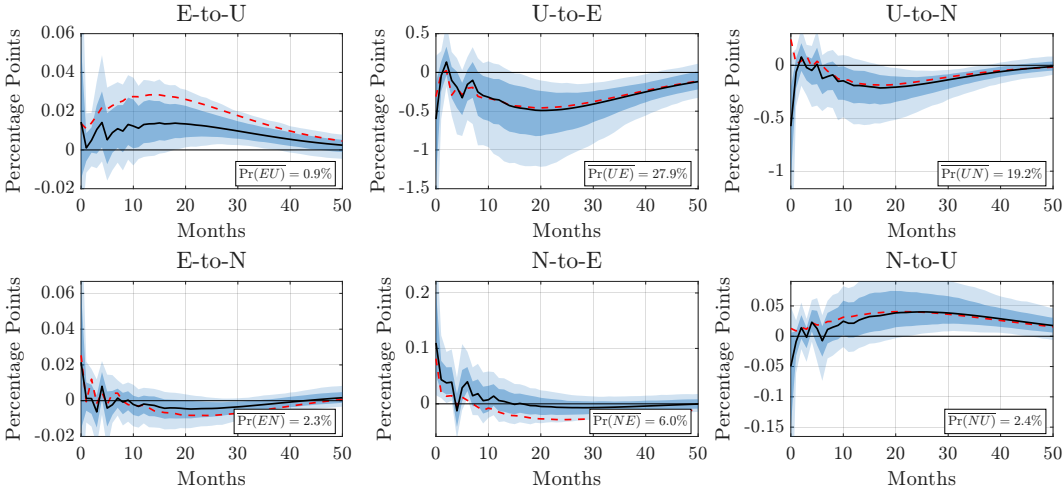
Heterogeneity in Labor Market Responses: Education



- Dashed Red: Our baseline estimates
- Decline in E-to-N concentrated among less educated

Flows: Coll+ | Flows: HS+ | Back

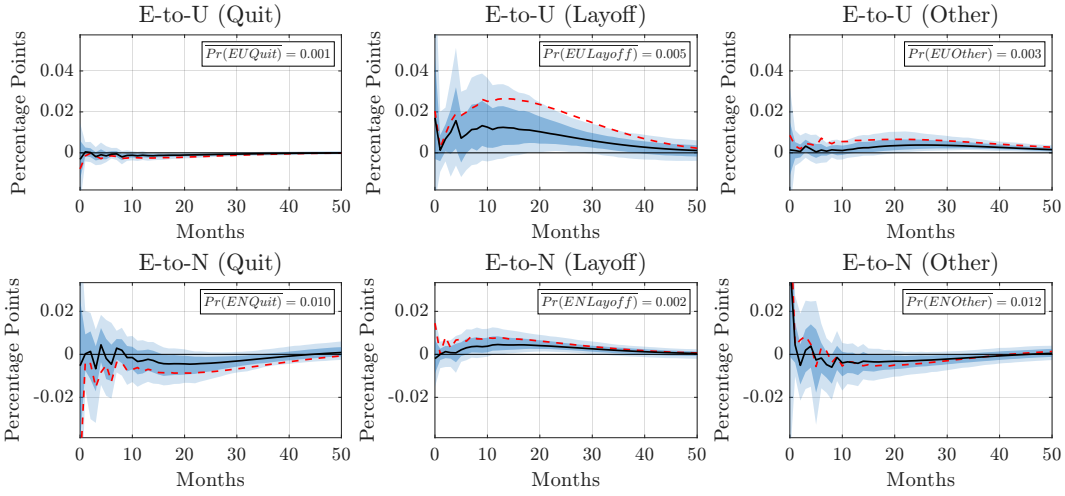
Labor Market Flows: Higher-Educated



- Dashed Red: Our baseline estimates

Back

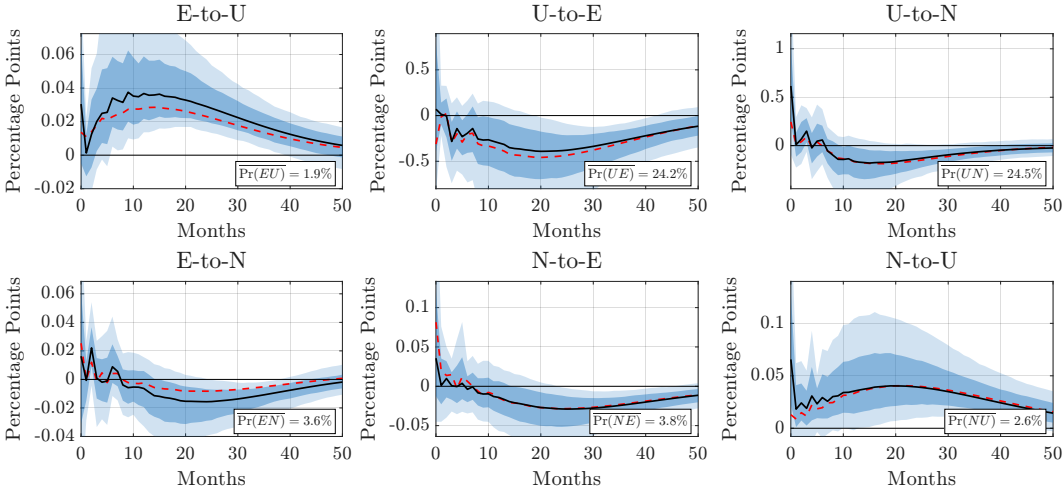
Quit/Layoff Responses: Higher-Educated



- Dashed Red: Our baseline estimates

Back

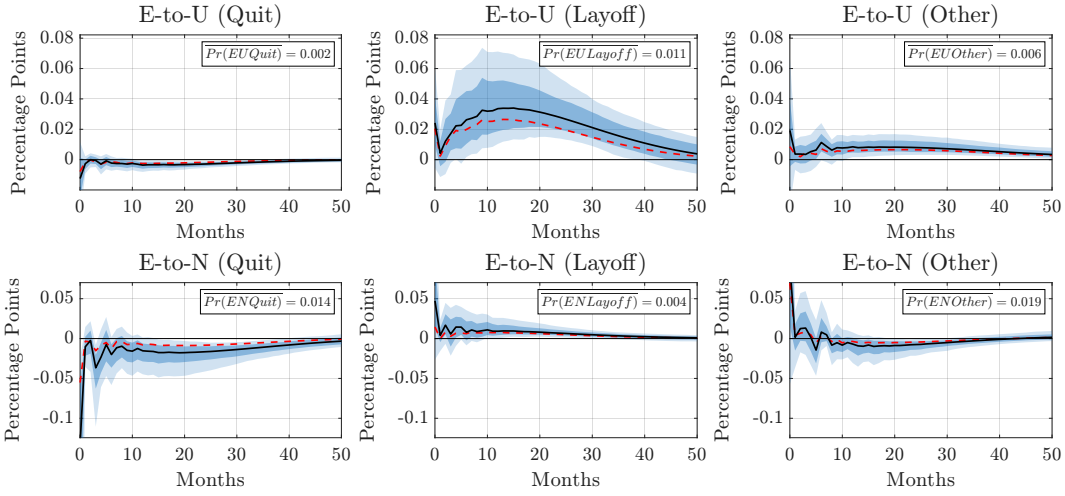
Labor Market Flows: Lower-Educated



- Dashed Red: Our baseline estimates

Back

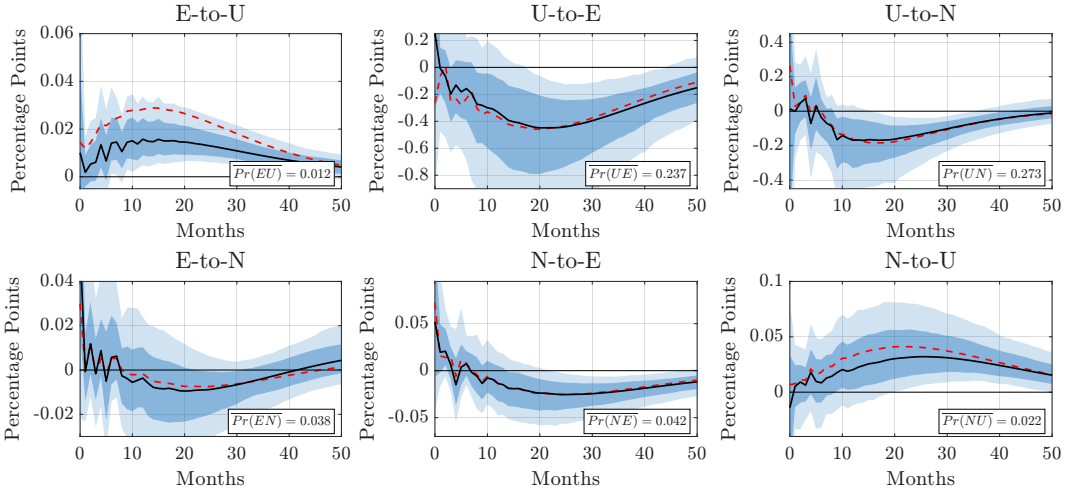
Quit/Layoff Responses: Lower-Educated



- Dashed Red: Our baseline estimates

Back

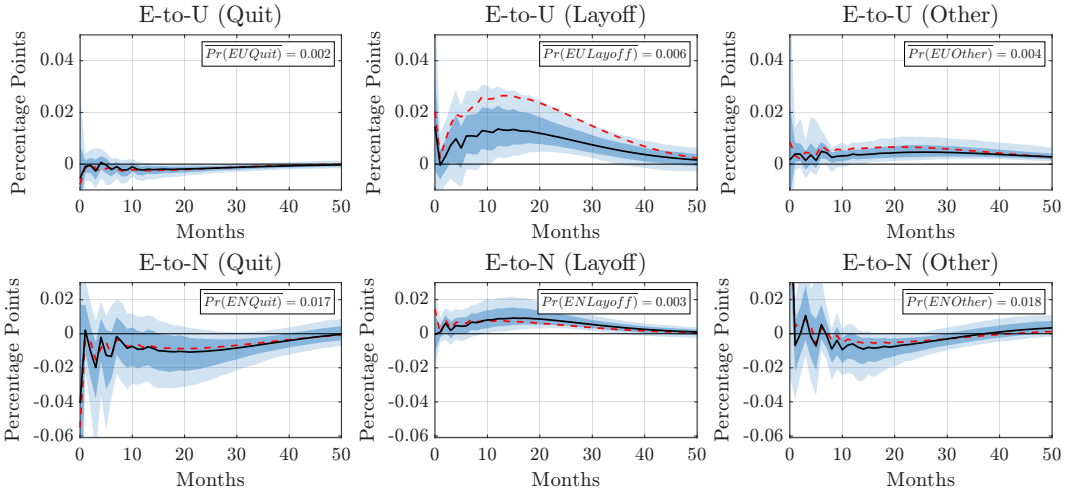
Labor Market Flows: Female



- Dashed Red: Our baseline estimates

Back

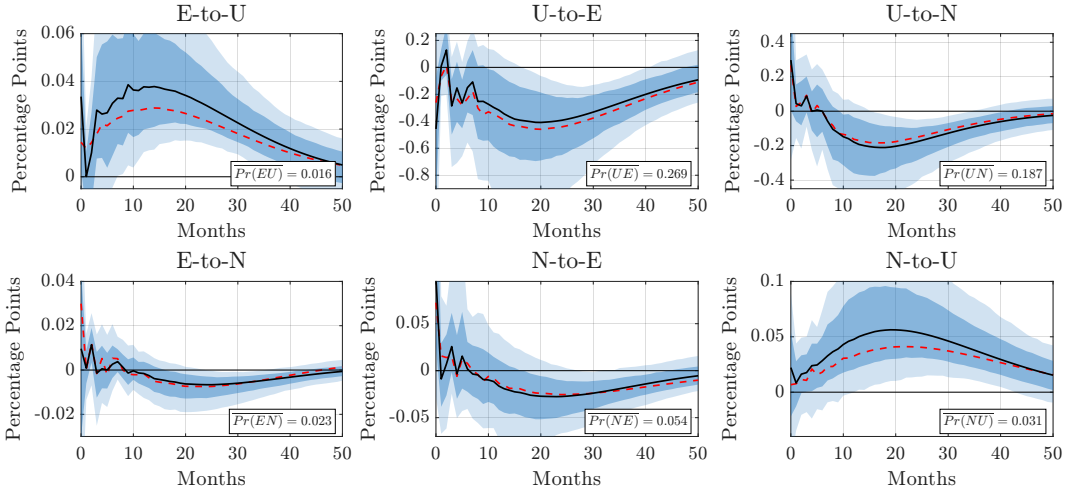
Quit/Layoff Responses: Female



- Dashed Red: Our baseline estimates

Back

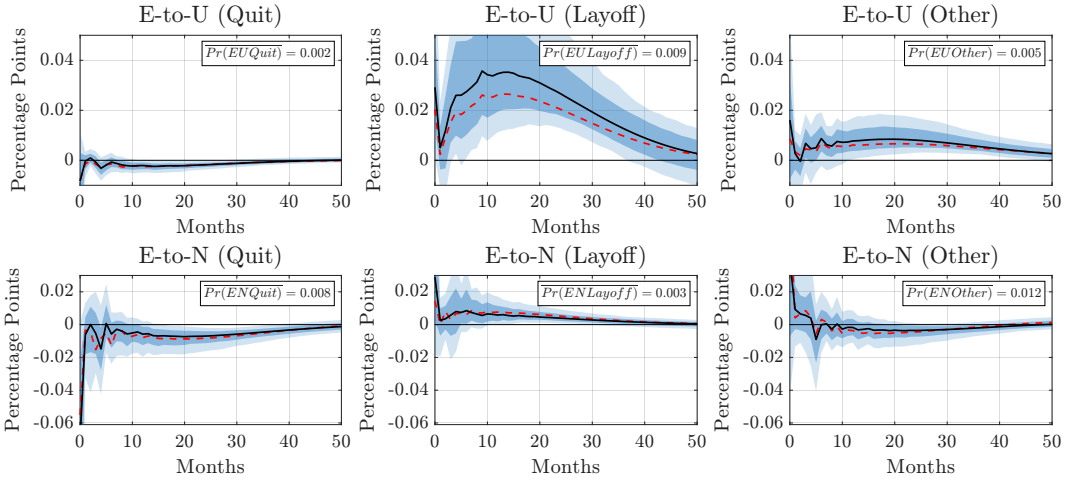
Labor Market Flows: Male



- Dashed Red: Our baseline estimates

Back

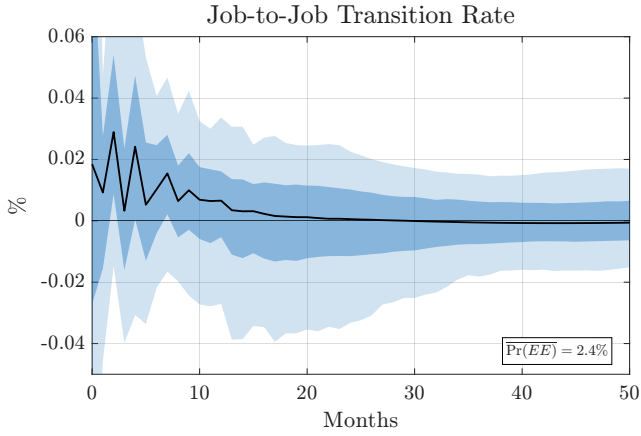
Quit/Layoff Responses: Male



- Dashed Red: Our baseline estimates

Back

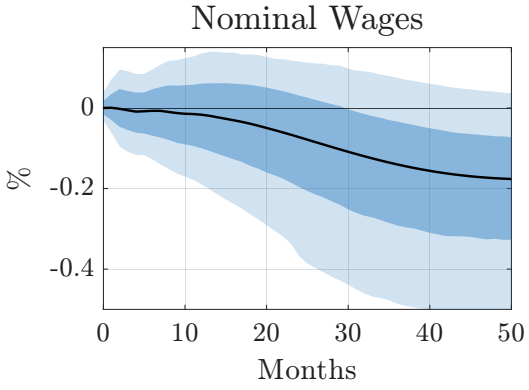
Response of Job-to-Job Flows (1994-2019)

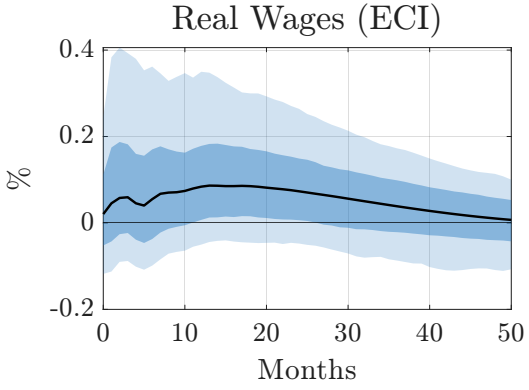


- Recent literature posits important role of job-to-job transitions for inflation
  - e.g. Faccini & Melosi (2023), Moscarini & Postel-Vinay (2025), Birinci et al (2025)
- Our estimates show no response of EE rate to contractionary MPS

Back

Response of Wages



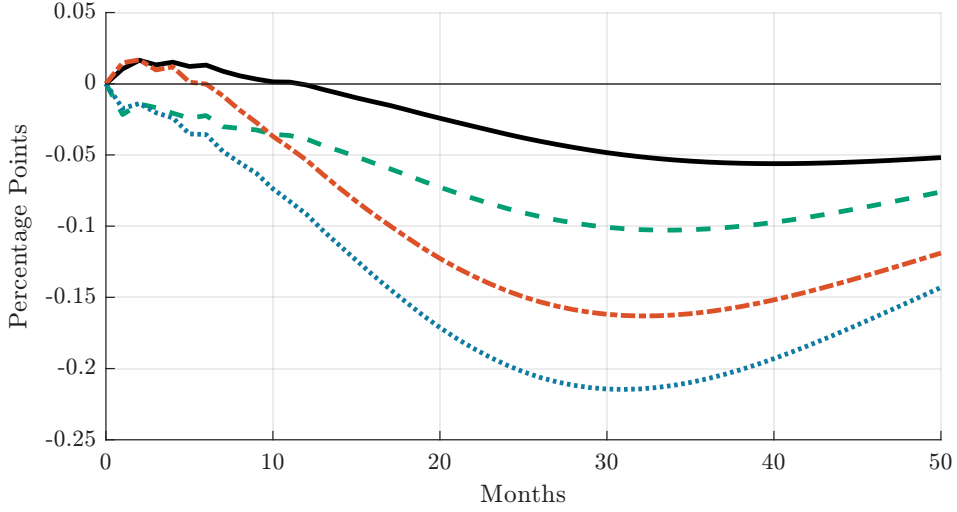


- Nominal wages decline more slowly than CPI

  $\Rightarrow$ real wages rise very slightly in the short-run

Back

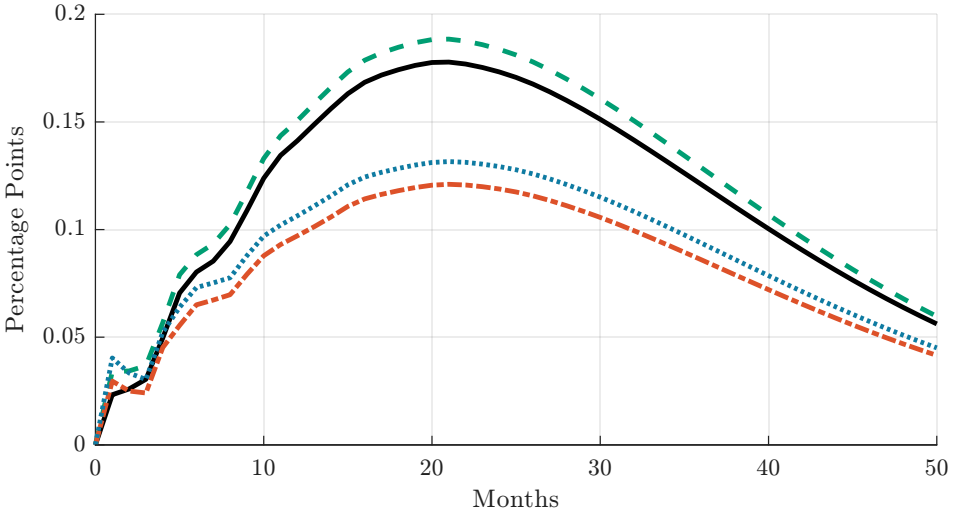
Participation Response to a Monetary Policy Shock



- With response of supply-driven flows fixed $\Rightarrow$ Participation far more procyclical

Back

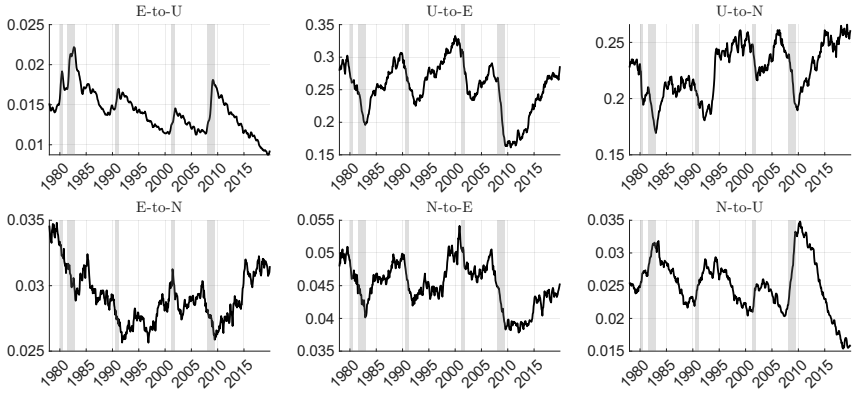
Unemployment Response to a Monetary Policy Shock



- Response of quits not important for unemployment dynamics

Back

Time Series of Labor Market Flows



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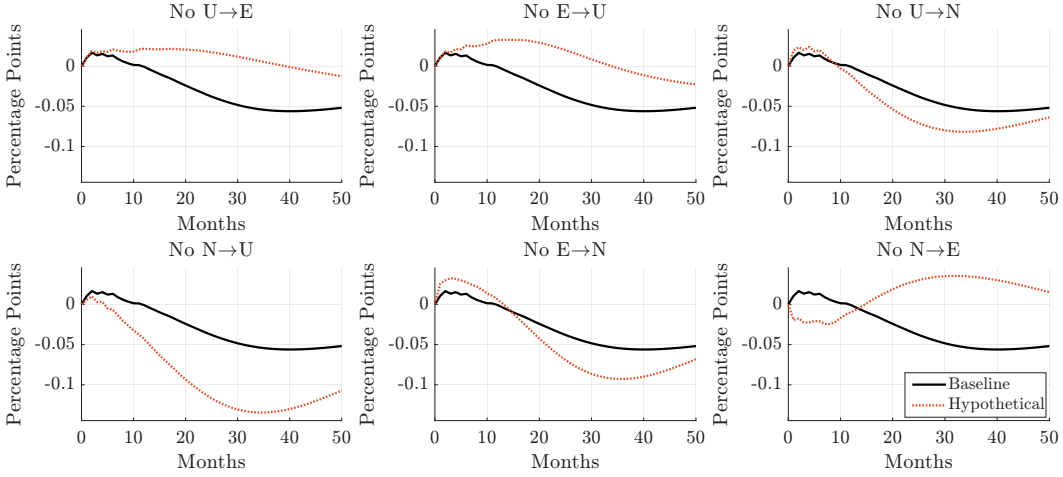
The Ins and Outs of Participation



- E→U and U→E are important for participation cycle

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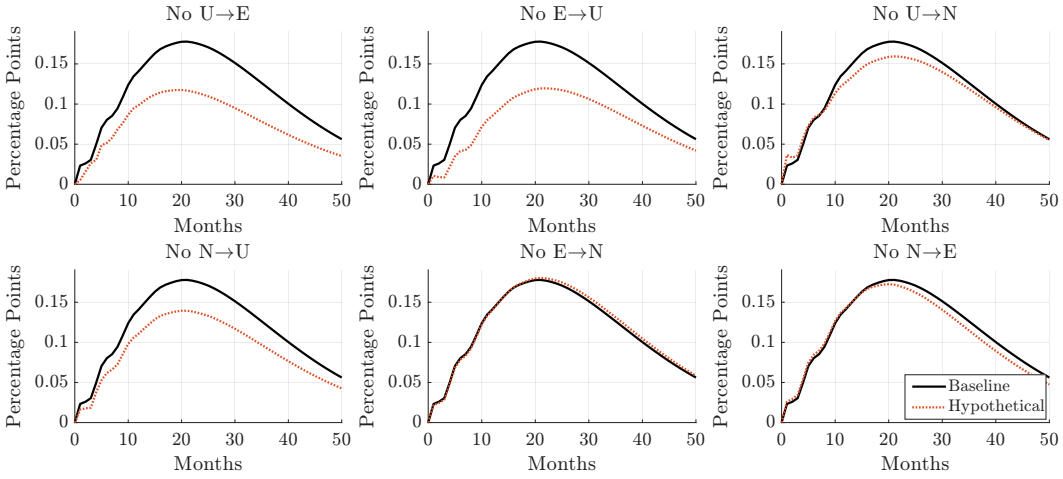
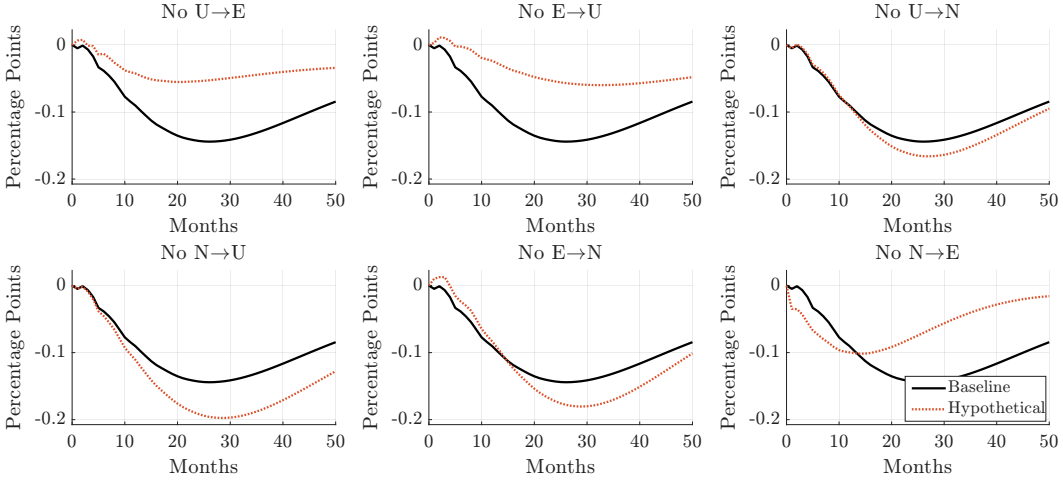
The Ins and Outs of Unemployment



- E→U and U→E roughly equally responsible for rise in unemployment

Back

The Ins and Outs of Employment



- N→U more important than U→N for supporting employment

Back

Timing within a Model Period

1. All individuals draw a new value of productivity, z. Non-employed individuals draw an i.i.d. search cost, κ.
2. Employed individuals make consumption/saving decisions and choose whether or not to quit their job. Non-employed individuals make consumption/saving decisions and choose whether or not to search for a job.
3. Employed individuals who do not quit are exogenously laid off with probability δ. Non-employed individuals receive job offers with probabilities f_s of f_{ns}, depending on whether or not they actively search.
4. Non-employed individuals who receive job offers decide whether or not to accept such offers.
5. UI-eligible non-employed individuals who search and either do not receive a job offer or do not accept an offer are subject to UI expiry with probability δ_{UI}.

Back

Estimation: A Monetary Policy Shock in the Model

- Feed in response of job-finding rate, layoff rate, real interest rates and wages from the data
- Overall response of labor market flows also determined by endogenous changes in policy functions + distribution of households across labor market states

Estimation: A Monetary Policy Shock in the Model

- Feed in response of job-finding rate, layoff rate, real interest rates and wages from the data
- Overall response of labor market flows also determined by endogenous changes in policy functions + distribution of households across labor market states
- Calibrate a number of parameters, $\theta_{EXT} \equiv \{\beta, \gamma, \bar{R}, \delta_{UI}, w, \alpha, \phi, \bar{\phi}, \tau, T\}$
  - Assume $u(c) = \frac{c^{1-\gamma}-1}{1-\gamma}$, $f_{ns} = \alpha f_s$

Estimation: A Monetary Policy Shock in the Model

- Feed in response of job-finding rate, layoff rate, real interest rates and wages from the data
- Overall response of labor market flows also determined by endogenous changes in policy functions + distribution of households across labor market states
- Calibrate a number of parameters, $\theta_{EXT} \equiv \{\beta, \gamma, \bar{R}, \delta_{UI}, w, \alpha, \phi, \bar{\phi}, \tau, T\}$
- Estimate remaining parameters to match IRFs of labor market flows
  - À la Christiano, Eichenbaum, Evans (2005) or Auclert, Rognlie, Straub (2020)

$$\theta_{EST} \equiv \{\rho_z, \sigma_z, \mu_\kappa, \sigma_\kappa, \psi, \delta_L, f_s\}$$
$$\hat{J} = \{EU_t, EN_t, UE_t, UN_t, NE_t, NU_t\}_{t=0}^{50}$$
$$\hat{\theta}_{EST} = \arg\min_{\theta_{EST}} (J(\theta_{EST}) - \hat{J})' \Sigma^{-1} (J(\theta_{EST}) - \hat{J})$$

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Model Parameters

Calibrated

Parameter	Description	Value	Source/Target
β	Discount factor	0.988	Quarterly MPC of 7-8%
R	Steady state real interest rate	1.001	1% Annual
γ	Risk Aversion Coefficient	2	Standard value
δ^{UI}	Benefit Exhaustion Probability	0.167	Expected duration of UI
w	Wage	1	Normalization
α	Efficiency of Passive Search	0.6	N-to-E | want a job
ϕ	UI Replacement Rate	0.50	Graves (2025)
$\bar{\phi}$	Maximum UI payments	2.15	Graves (2025)
τ	Labor income tax rate	0.33	Auclert et al. (2021)
T	Lump-sum Transfer	0.28	Auclert et al. (2021)

Estimated

Parameter	Description	Value	Standard Error
ρ_z	Persistence of Labor Productivity	0.961	(0.013)
σ_z	Standard Deviation of Labor Productivity	0.392	(0.025)
μ_κ	Mean value of Search Cost	0.878	(0.181)
σ_κ	Dispersion of Search cost	0.188	(0.041)
ψ	Value of Leisure	0.318	(0.215)
δ	Steady-state Layoff Rate	0.019	(0.003)
f_s	Steady-state Job-Finding Rate	0.272	(0.029)

◂ Back

Steady-State Labor Market Flows

Flow	Model	Data
EU	0.0142	0.0142
EN	0.0292	0.0292
UE	0.2540	0.2539
UN	0.2259	0.2258
NE	0.0451	0.0451
NU	0.0252	0.0251

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MPC Evidence

- Model produces *quarterly* MPC of 7-8%
- In line with "notional MPC" estimates from Orchard et al. (2023), Boehm et al. (2024)

TABLE 3—FIRST-QUARTER MPX AND MPC ESTIMATES FOR CALIBRATION OF MACROECONOMIC MODELS

	Parker et al. (2013)	Broda and Parker (2014)	Borusyak, Jaravel, and Spiess (2023)	Orchard, Ramey, and Wieland (2023b)	This paper, treatment group 1
	(1)	(2)	(3)	(4)	(5)
Total MPX (%)	52.3 to 91.1	50.8 to 74.8	24.8 to 36.6	28	23
Nondurable MPX (%)	12.8 to 30.8	14.1 to 20.8	6.9 to 10.2	0	6.6
Notional MPC (%)	16.3 to 28.5	15.9 to 23.4	7.8 to 11.4	8.8	7.2

Notes: This table reports the first-quarter MPX and MPC in studies of the 2008 tax rebates in the United States (columns 1–4) and for treatment card 1 participants in our experiment (column 5). The first row reports the MPX on all goods and services, while the second row focuses on nondurables alone. The third row follows the methodology of Laibson, Maxted, and Moll (2022) and reports the model-consistent ("notional") MPC that can be used as a target for macroeconomic models, equal to the total MPX divided by 3.2. The range of estimates in column 1 corresponds to different household samples (see Tables 2 and 3 of Parker et al. (2013)). The range of estimates in columns 2 and 3 corresponds to the lowest and highest values among the three rescaling methods used by Broda and Parker (2014) and Borusyak, Jaravel, and Spiess (2023) to extrapolate the spending response they observe for consumer-packaged goods to broader samples. The estimates in the first two rows of column 4 are taken from Tables 3 and 5 of Orchard, Ramey, and Wieland (2023b). We compare our estimates to a larger set of papers in online Appendix Figure D13.

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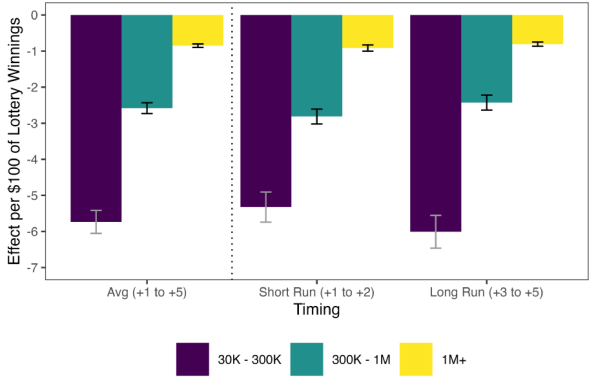
MPE Evidence

- Model produces *annual* MPE of 5-6%
- In line with Golosov et al. (2023), when considering "small" lotteries: $30K-300K

Figure B.6: Wealth effects by prize size over time



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Steady-State Labor Market Flows: Heterogeneity

Flow	Data	Model	Data (Low Educ)	Data (High Educ)	Model (Low Prod)	Model (High Prod)
EU	0.014	0.014	0.019	0.009	0.015	0.014
EN	0.029	0.029	0.036	0.023	0.043	0.019
UE	0.254	0.254	0.242	0.279	0.234	0.266
UN	0.226	0.226	0.245	0.192	0.263	0.202
NE	0.045	0.045	0.038	0.060	0.027	0.082
NU	0.025	0.025	0.026	0.024	0.018	0.042

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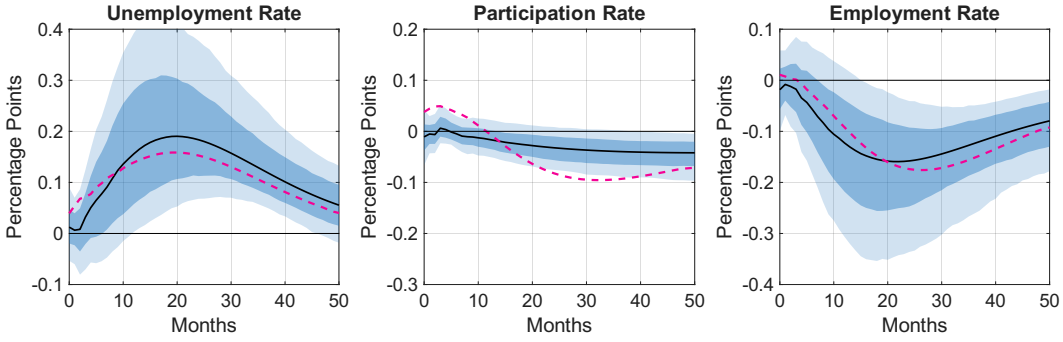
Response of Labor Market Stocks: Model vs Data



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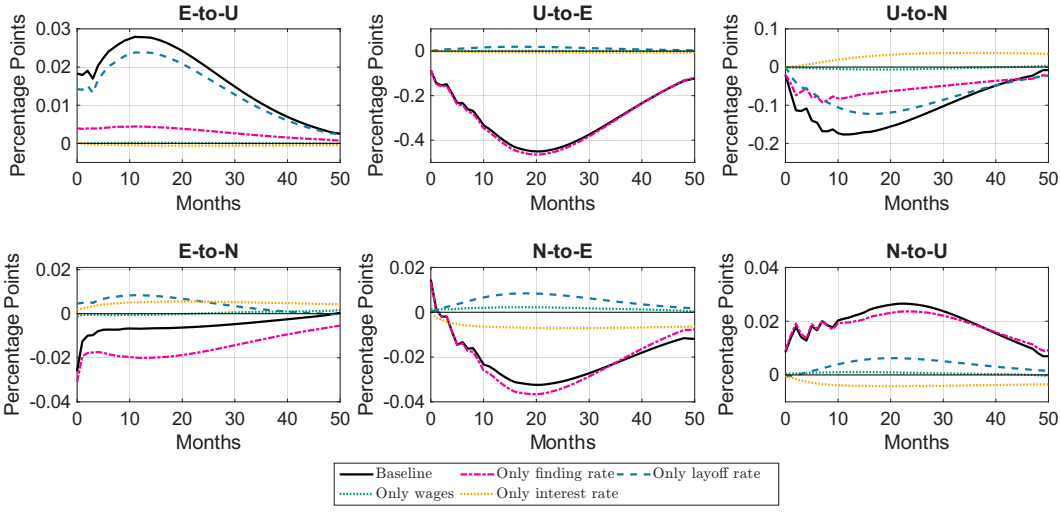
Decomposed Response of Labor Market Flows



- Drop in quits due to drop in job-finding rate
- Increase in layoffs reduces U-to-N flows through composition effect

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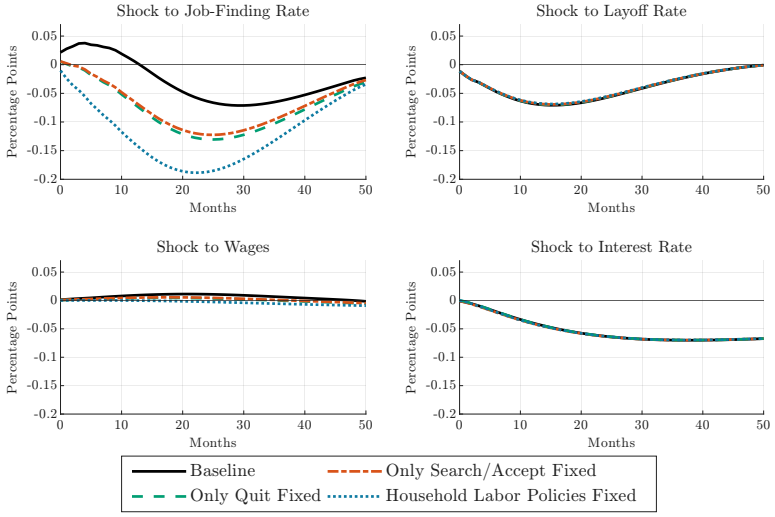
Decomposition: All Four Components



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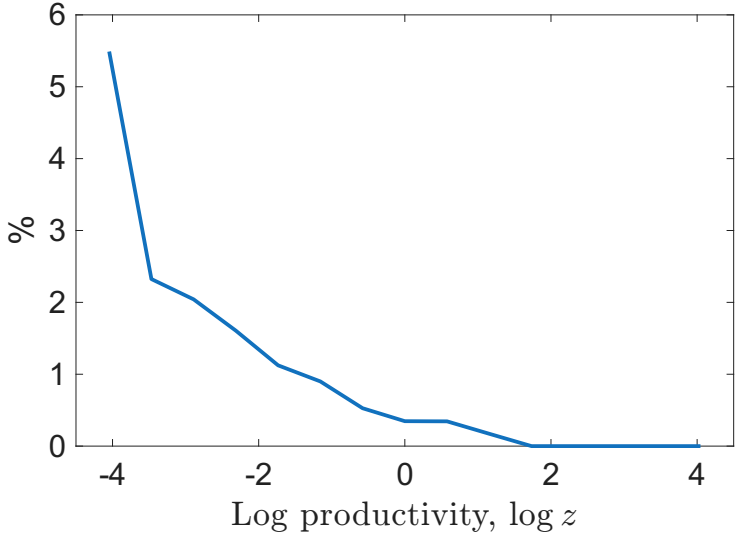
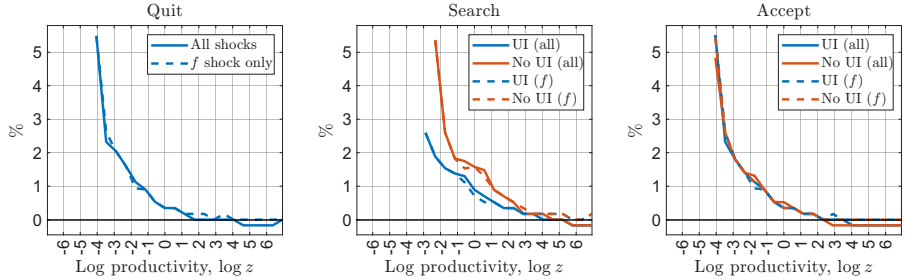
Change in Wealth of Marginal Quitter After Shock



- *Marginal quitter*: lowest wealth at which employed worker quits (for each z)
- Threshold shift larger for low productivity: closer to borrowing constraint

Change in Wealth of Marginal Quitter, Searcher and Accepter

For each z: *marginal quitter* = min wealth to quit; *marginal searcher* = max wealth to search; *marginal accepter* = max wealth to accept



- Solid = all shocks; dashed = job-finding rate only. Larger shifts for low-z workers (closer to borrowing constraint)

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Related Literature

- **Labor Market Flows:** Fujita & Ramey (2009), Elsby et al (2009), Shimer (2012), Elsby et al (2015), Hobijn & Şahin (2021), Fujita et al (2023)
  - We provide a new decomposition of EN transitions into quits/layoffs

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- **Models with Frictional Labor Markets:** Krusell et al (2017), Cairo et al (2022), Alves & Violante (2023)
  - Provide evidence showing importance of participation margin
  - New empirical estimates that NK search and matching models can target

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