

The Puzzling Post-Pandemic Labor Market Dynamics

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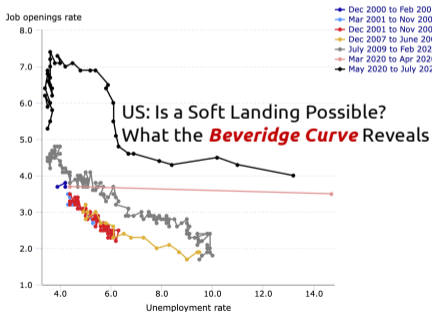
Based on joint works with Sadhika Bagga, Gadi Barlevy, Richard Crump, Stefano Eusepi, Marc Giannoni, Bart Hobijn, Jason Faberman, Lukas Mann, Gianluca Violante

Post-pandemic labor market

Beyoncé's new song is an anthem for the *Great Resignation*

Workers willing to accept pay cuts of 10% on average in exchange for 2 workdays a week of *WFH*.

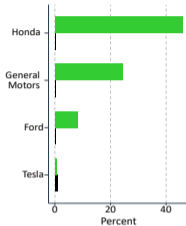
The Beveridge Curve (job openings rate vs. unemployment rate), seasonally adjusted
Click and drag within the chart to zoom in on time periods



Source: U.S. Bureau of Labor Statistics

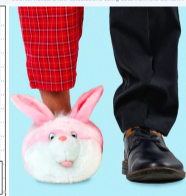
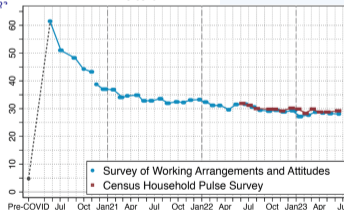
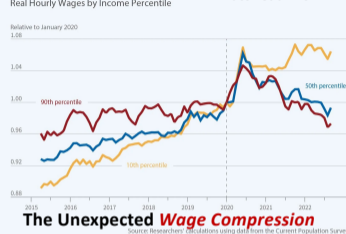
Has the *Willingness to Work* Fallen during the Covid Pandemic?

C. Selected Auto Manufacturing Firms, Engineering Occupations (SOC 17-2)



Real Hourly Wages by Income Percentile

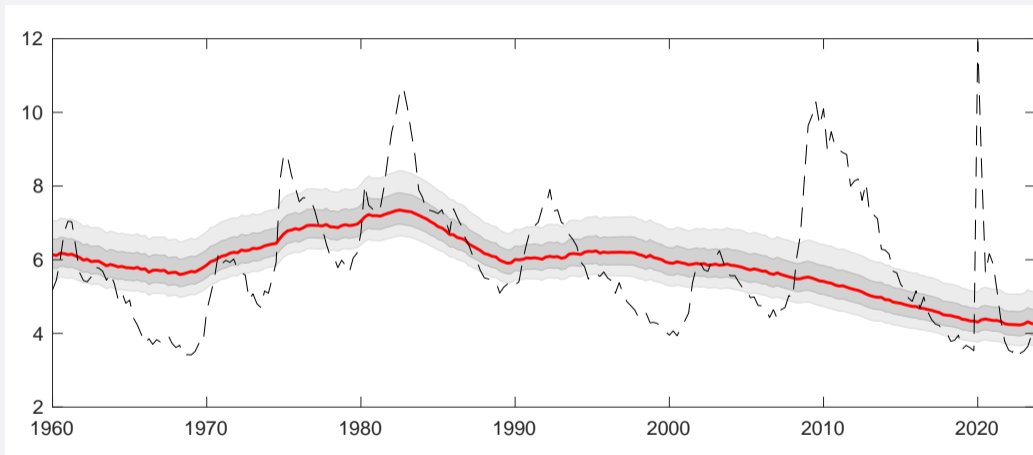
Autor et al. 2022



47% of Employees Say They'll Quit if Employer Orders Return to Office Full Time, According to Integrated Benefits Institute Analysis

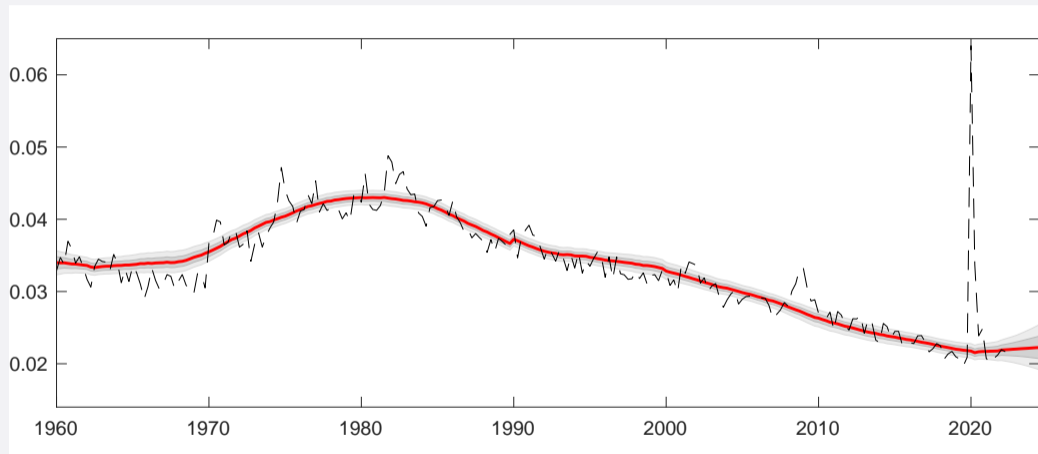
Unemployment and Participation

Trend unemployment continues to be low



Reference: Crump, Eusepi, Giannoni and Şahin (2019, 2022)

Unemployment incidence has steadily declined



Reference: Crump, Eusepi, Giannoni and Şahin (2019, 2022)

Two main reasons for the trend decline in unemployment inflows

Grand Gender Convergence

- Increase in female labor force participation from around 47% in 1976 to 60% in 2000.
- As social norms and policies changed in the late 1970s and 1980s, employment relationships of women became more stable. This meant fewer career interruptions and reduced the unemployment inflow rate.

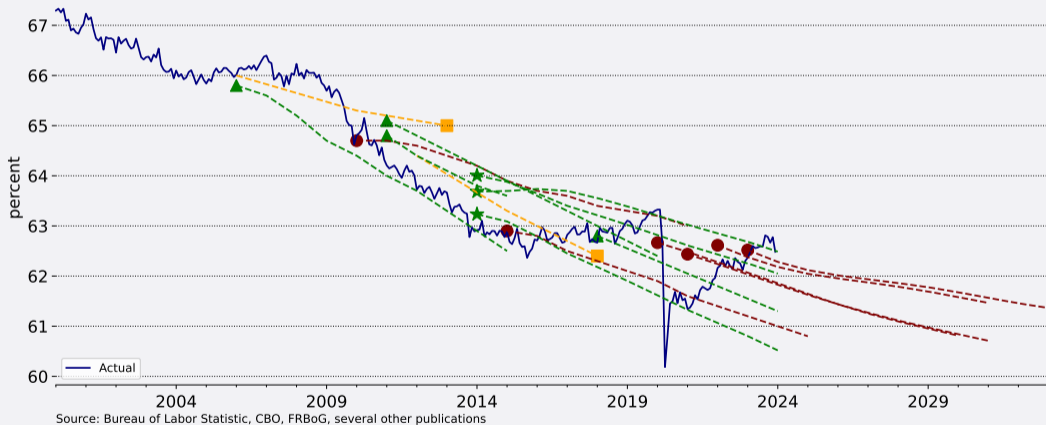
Dual Aging

- In the 1970s, Boomers were in their teens and twenties and had less stable jobs and frequent unemployment spells. This contributed to higher unemployment inflows.
- As Baby Boomers entered their prime ages and settled in more steady jobs in the 1980s and 1990s, their inflow rate into unemployment trended down.
- Moreover, the ongoing decline in firm entry shifted employment to older firms reducing job destruction.

Labor force participation trend predates the COVID-19 Pandemic

Labor Force Participation Rate, Actual and Trend Estimates

Monthly observations; seasonally adjusted



Source: Bureau of Labor Statistic, CBO, FRBoG, several other publications

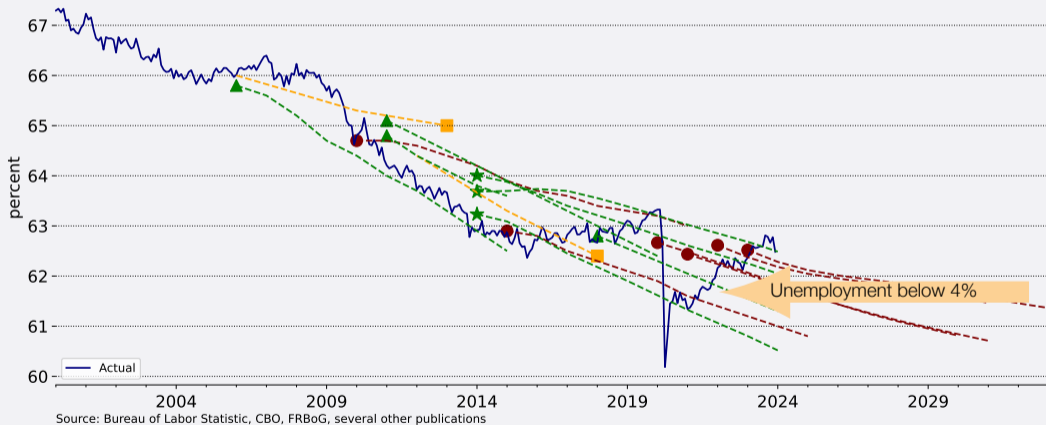
○ CBO trend estimates (2011,2015,2020,2021), ■ Tealbook estimates (backward-looking, Jan 2011 and Jan 2015), * Aronson et. al, BPEA 2014 and ▲ from Aronson et. al. 2006, Aronson, 2012, VanZandweghe et al. 2012, and Hornstein et. al. 2018.

Reference: Hobijn and Şahin (2021, 2022)

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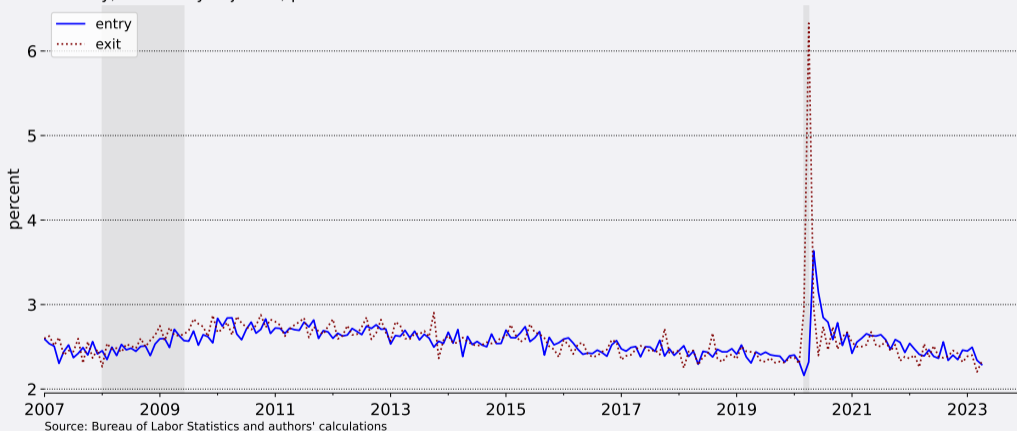
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Reference: Hobijn and Şahin (2021, 2022)

Emphasis on labor force entry/exit dynamics during the pandemic

Labor Force Entry and Exit Rates

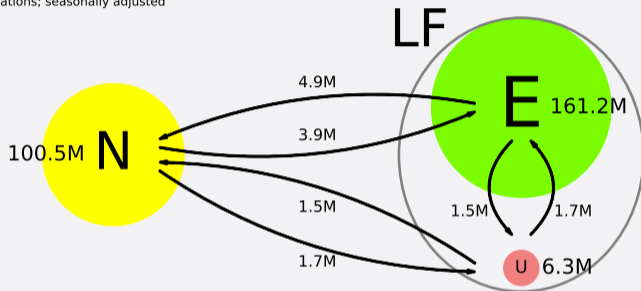
monthly; seasonally adjusted; percent of labor force



Participation dynamics more subtle

Flow Origins of Participation: Dec 2023

Monthly observations; seasonally adjusted



- Flows \gg Net changes in stocks
 - Large flows in and out of labor force
- Unemployed are less attached than the employed
 - Attachment wedge

Source: Bureau of Labor Statistics

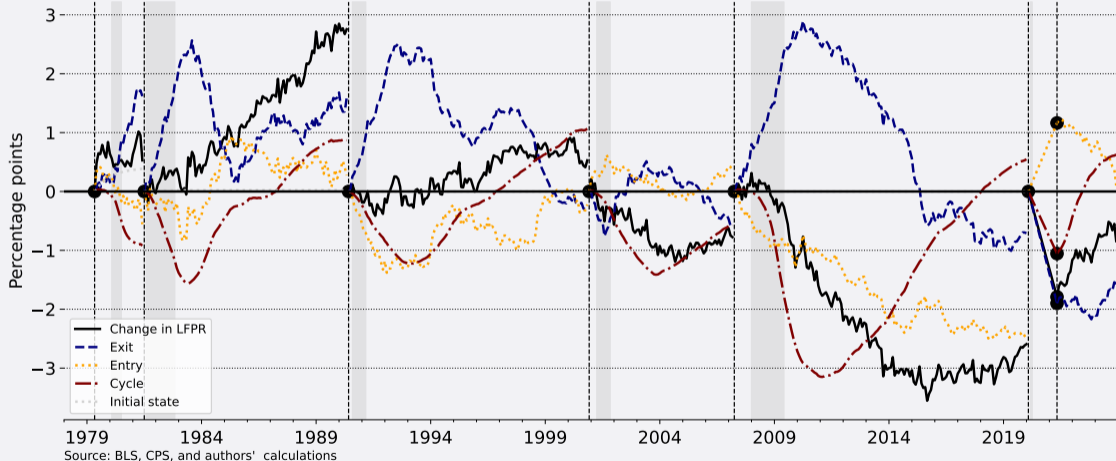
Key Intuition: When someone moves from U to E, they are more likely to remain in the labor force going forward. This simple mechanism (the participation cycle) is the source of procyclicality of participation, not labor force entry and exit.

Reference: Hobijn and Şahin (2021, 2022)

Participation cycle lagged the unemployment cycle as always

Trough to trough LFPR changes decomposed

Monthly observations; seasonally adjusted; cumulative change since unemployment trough; Total

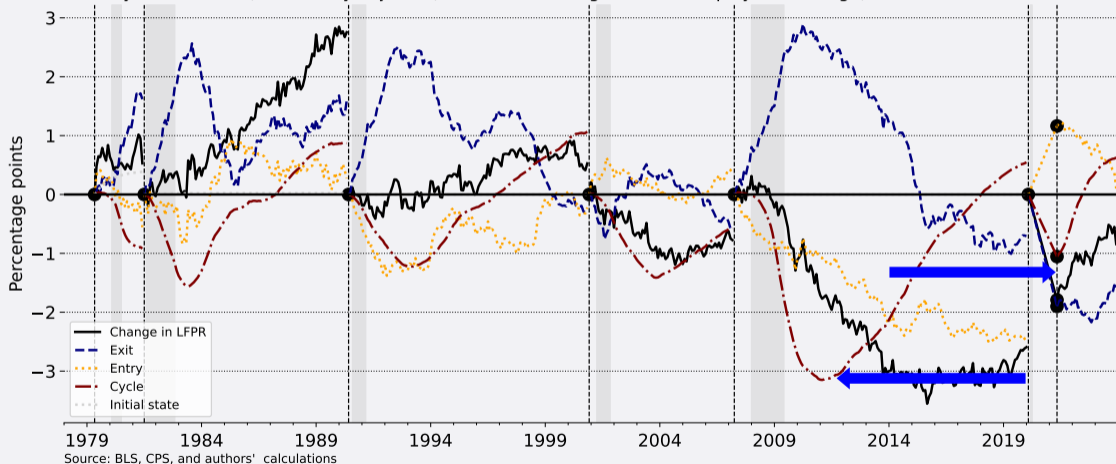


Source: BLS, CPS, and authors' calculations

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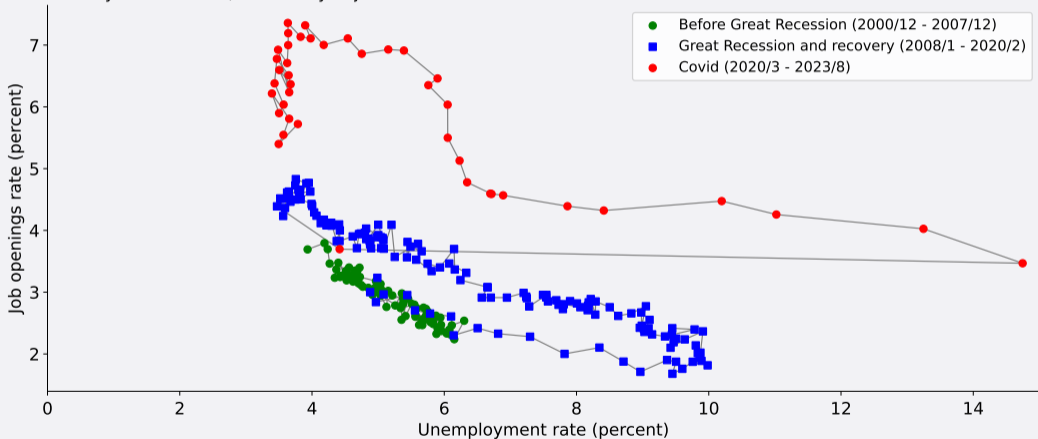
Source: BLS, CPS, and authors' calculations

Just a Quick Recovery?

Beveridge Curve exhibited a series of unusual shifts

U.S. Beveridge Curve: Nov-2000 - Aug-2023

Monthly observations; seasonally adjusted

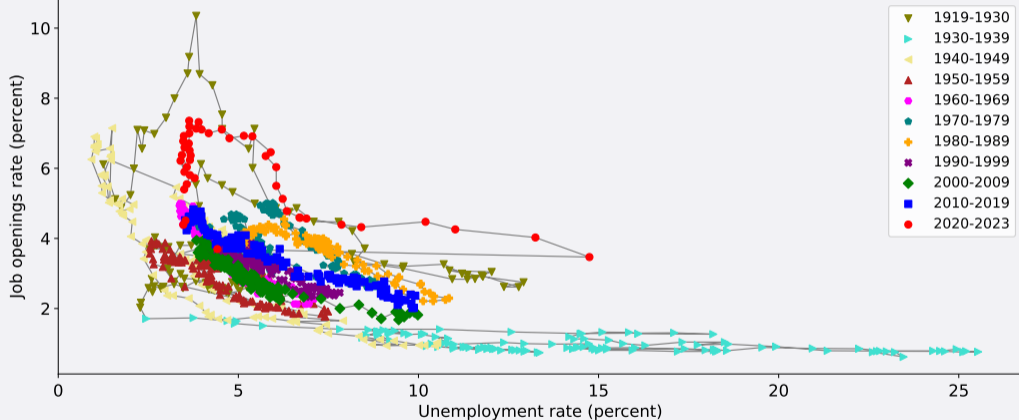


Source: Bureau of Labor Statistics, JOLTS

Pandemic period in historical context

U.S. Beveridge Curve: 1919 - Now

Monthly observations; seasonally adjusted



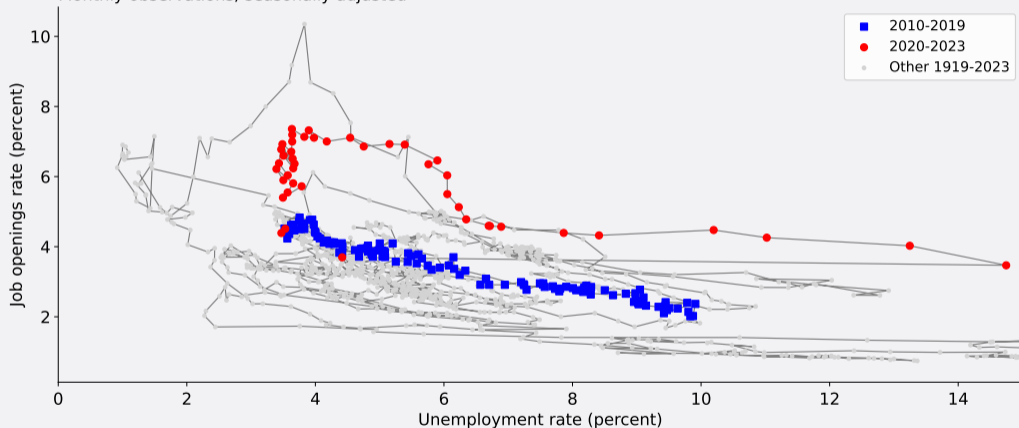
Source: Bureau of Labor Statistics and Petrosky-Nadeau and Zhang (2021)

Reference: Barlevy, Faberman, Hobijn, and Şahin (2023)

2020-2023: Pandemic-related factors

U.S. Beveridge Curve: 1919 - Now

Monthly observations; seasonally adjusted



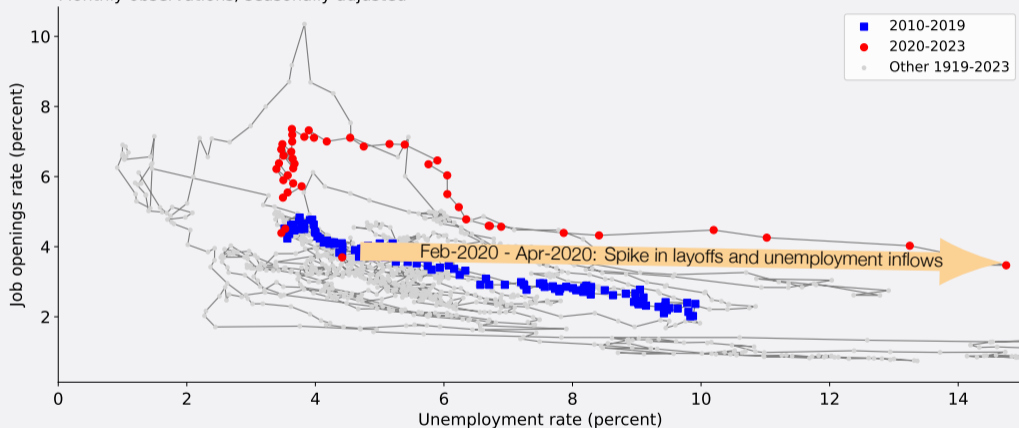
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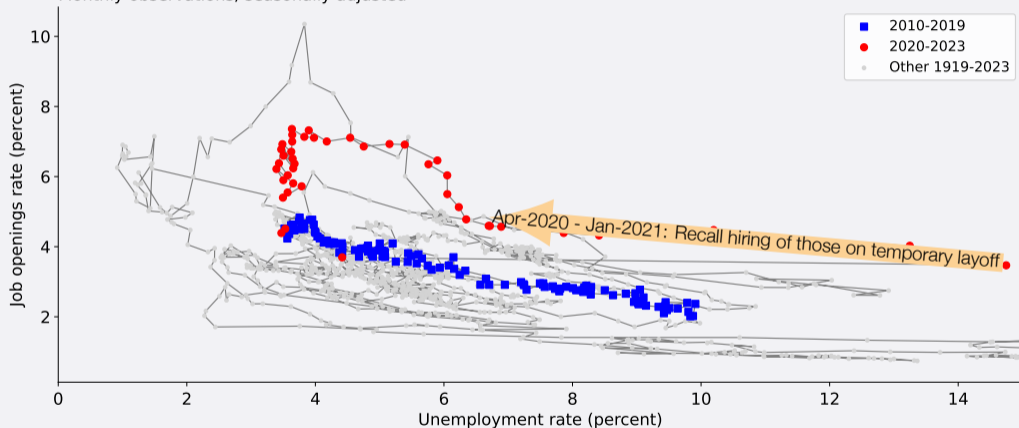
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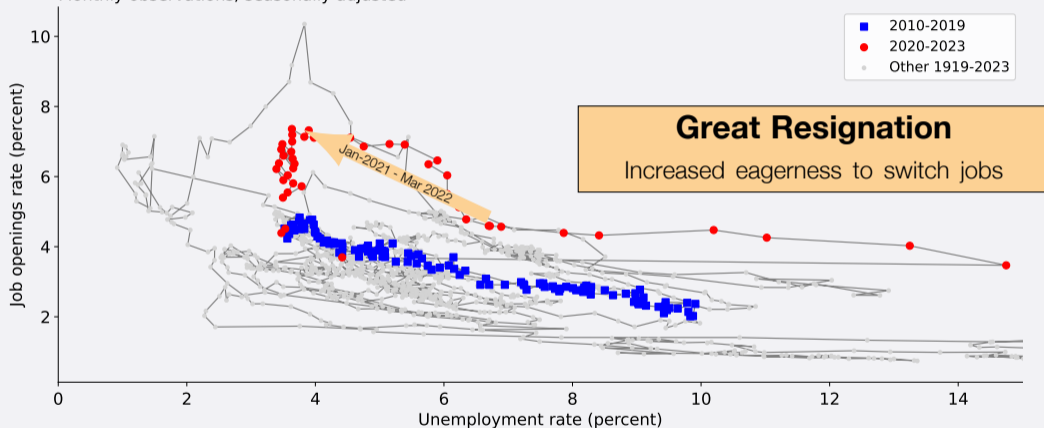
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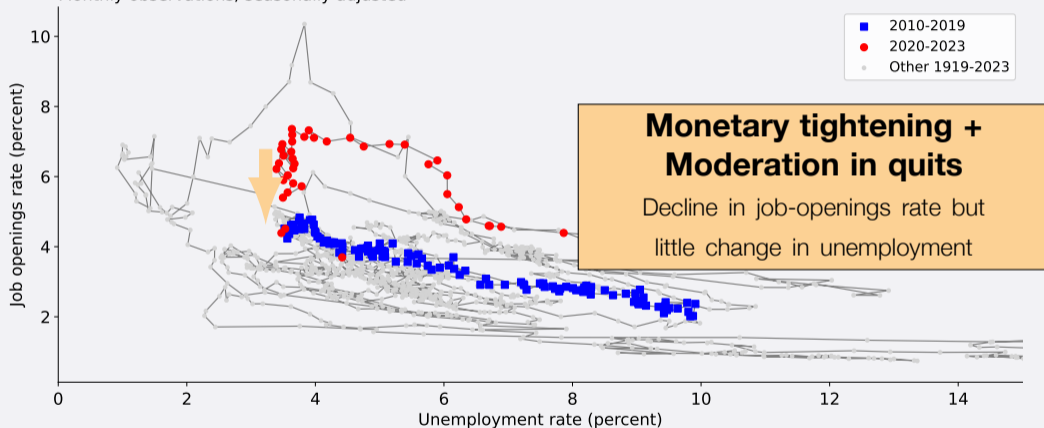
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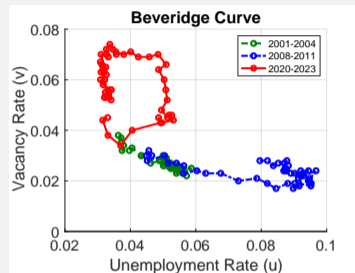
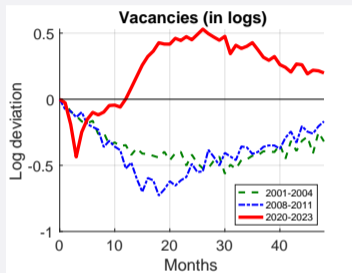
Monthly observations; seasonally adjusted



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Comparison with Recent Recoveries

Unemployment and vacancies

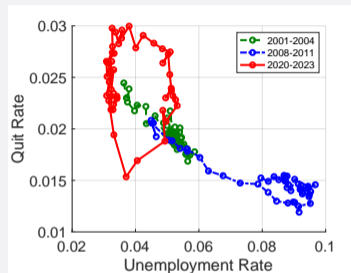
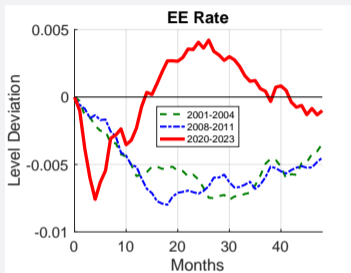


Sources: CPS, JOLTS

- Substantial shift in vacancies without much change in unemployment

Reference: Bagga, Mann, Şahin and Violante (2023)

Quit and EE rates

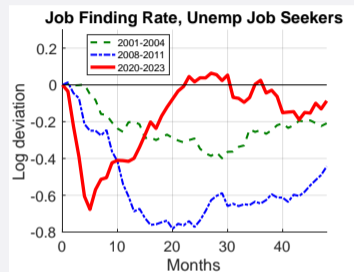
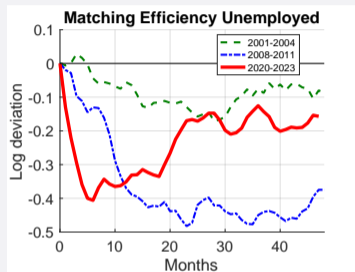


Sources: CPS, JOLTS

- Lots of **reallocation** through quits and EE transitions → **Great Resignation**

Reference: Bagga, Mann, Şahin and Violante (2023)

Matching efficiency, job filling and job finding rates



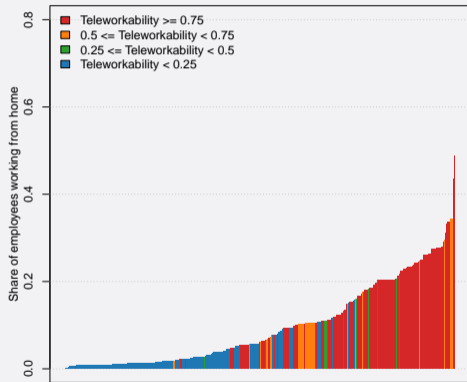
Sources: CPS, JOLTS

- Match efficiency is **unusually low** for a strong recovery, depressing filling and finding rates

Reference: Bagga, Mann, Şahin and Violante (2023)

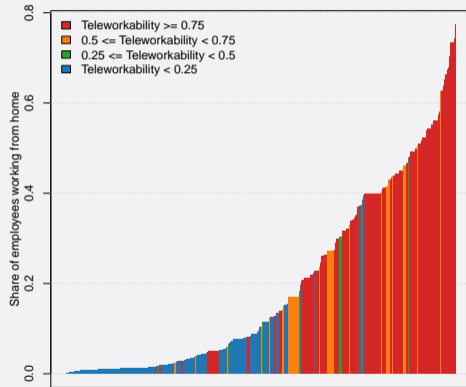
The rise of telework

(a) February 2020



SOC Broad Occupations, 5-digit

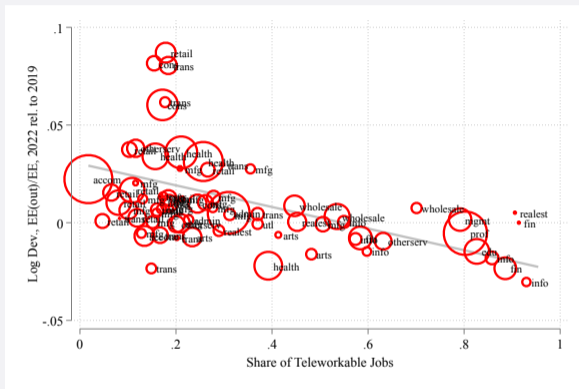
(b) October 2022 - December 2023



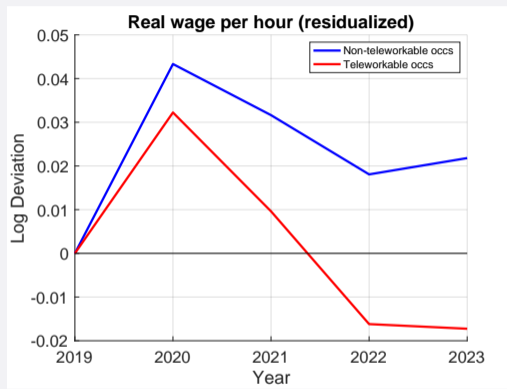
SOC Broad Occupations, 5-digit

Sources: CPS Telework Supplement, Dingel & Neiman (2020)

Telework and reallocation



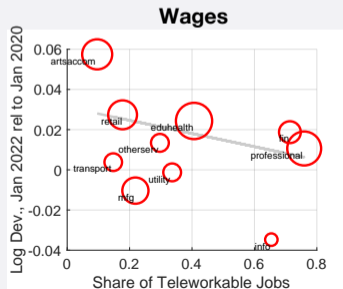
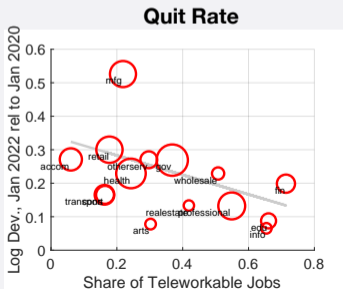
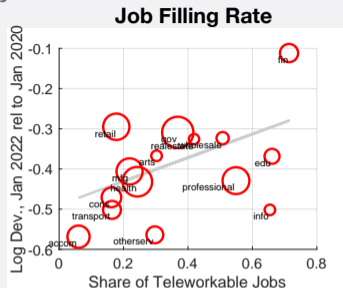
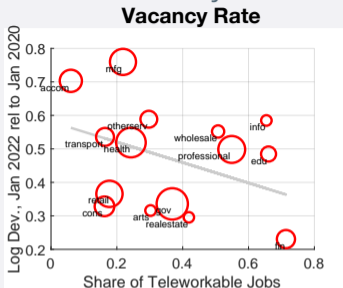
Source: Census J2J



Source: CPS ORG

- Workers leave non-teleworkable sectors
- Relative wage losses of TW jobs indicate supply-side driven reallocation

Aggregate variables by teleworkability



Sources: JOLTS, CES, Dingel & Neiman (2020)

Taking stock of time-series evidence

- Some **unique features** of the post-pandemic labor market recovery:
 1. Unemployment recovered very quickly
 2. Vacancies surged \Rightarrow massive shift in the Beveridge curve
 3. Sharp rise in quits and job-to-job transitions
 4. Unusually low aggregate matching efficiency for a recovery
- Recovery from this recession was **different, not just faster**

Reference: Bagga, Mann, Şahin and Violante (2023)

A Quantitative Framework

Model overview: Bagga, Mann, Şahin and Violante (2023)

Mortensen & Pissarides

1. Frictional labor market with random search → coexistence of u and v
2. Match-specific productivity → endogenous match efficiency

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+ Postel-Vinay & Robin

3. On-the-job search → EE flows
4. Bertrand competition for workers → wage distribution

Model overview: Bagga, Mann, Şahin and Violante (2023)

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+ Diamond

5. Sunk entry cost → vacancies are a stock → quits induce vacancies

Model overview: Bagga, Mann, Şahin and Violante (2023)

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+ Rosen + Roy

6. Jobs are heterogeneous in whether they offer **amenity** (a) → compensating differential
7. Workers are heterogeneous in their **preference for amenity** (x) → sorting & reallocation

Demographics and preferences

- Continuous time
- Continuum of ∞ -lived workers with measure one
- Discount the future at rate r
- Can be employed (e) or unemployed (u)
- Workers value **telework** which is an **amenity** provided by a subset of jobs
- Distribution of **taste for amenity** x across the population $\ell(x)$ (assume $x \in \{0, \bar{x}\}$)
- Linear flow utility for a worker of type x

$$U(x) = \begin{cases} w + xa & \text{if employed on match with amenity } a \text{ and wage } w \\ b & \text{if unemployed} \end{cases}$$

Jobs and amenities

- Endogenous mass of filled and vacant jobs
- Each job belongs to one of three types $n \in \{0, 1, 2\}$:

- **Non-teleworkable** ($n = 0$)

→ never offers the amenity

$$a(0) = \underline{a}$$

- **Teleworkable (passive)** ($n = 1$)

→ does not currently offer the amenity but may offer it in the future

$$a(1) = \underline{a}$$

- **Teleworkable (active)** ($n = 2$)

→ offers the amenity

$$a(2) = \bar{a}$$

- Newly created jobs begin their life in state $n = 0$ or $n = 1$
- At a Poisson rate, passive TW jobs may **upgrade** to the active state at a random cost $c \sim F_c(\cdot)$

Entry and production

- A vacant job has value $\Omega_t(n)$ where $n \in \{0, 1, 2\}$
- A fixed share ζ of newly created jobs is teleworkable
- Free entry of jobs upon payment of sunk cost κ :

$$\Omega_t := \underbrace{\zeta\Omega_t(1) + (1 - \zeta)\Omega_t(0)}_{\text{Ex-ante value of a vacant job}} = \kappa$$

- Vacancies are a stock:
 - Inflows come from new creation and separations
 - Outflows come from hires and job destruction
- Upon meeting, match productivity y is drawn from the distribution $y \sim F_y(\cdot)$
- After observing y , match is formed iff its surplus is positive
- Matches and vacancies are destroyed at exogenous rates δ and δ_v , respectively

Wage protocol and surplus

- Contractual environment based on Postel-Vinay & Robin (2002):
 1. Negotiation protocol: firms make take-it-or-leave-it offers to workers
 2. Renegotiation only under mutual consent
 3. Firms and workers commit to **upgrading** iff it is surplus-maximizing

- **Gross surplus dynamics:**

$$(r + \delta)S_t(x, y, n) = Z_t^y y - Z_t^b b + Z_t^x x a(n) + \delta \Omega_t(n) \\ + \text{upgrading term} + \partial_t S_t(x, y, n), \quad \text{with } S_t(x, y, n) \geq \Omega_t(n)$$

- Model is not block-recursive, but allocations can be computed without wages
- Three aggregate shocks: **productivity**, **value of leisure**, **value of the amenity**

Calibration

Steady-state parameters and corresponding targets

Parameter		Value	Target to match	Target value
Discount rate	r	0.05/12	<i>External</i>	
Elasticity of meeting function	α	0.5	<i>External</i>	
Productivity dispersion	SD(log y)	0.039	Response of u to y shock	
Entry cost	κ	1.89	Meeting rate of unemployed	1.5
Opportunity cost of work	b	1.01	UE rate	0.3
Search effort of employed	s	0.89	EE rate / UE rate	0.07
Separation rate	δ	0.015	EU rate	0.015
Vacancy destruction rate	δ_v	0.33	Share of replacement hires	0.5
Share of pop. with $x = \bar{x}$	$\ell(\bar{x})$	0.5	<i>Barrero, Bloom & Davis (2021)</i>	
Prob. of TW job creation	ζ	0.26	Share of teleworkable empl.	37%
Utility flow from amenity	\bar{x}	0.048	Compensating differential	2.5%
Amenity	\underline{a}, \bar{a}	-0.35, 0.65	Long run response of u to x	0
Parameters of $F_c(c) = \xi_1 c^{\xi_2}$	ξ_1, ξ_2	0.001, 4.0	Level + rise in TWA vacancies	0.1, 0.1

Model period is [one month](#).

Shocks Estimation

Methodology

- Let f_{sj}^d be the IRF of variable d at horizon j with respect to shocks s
 1. Productivity y
 2. Value of leisure b
 3. Value of the amenity \bar{x}
- Approximate dynamics of variable d_t assuming additivity with respect to the 3 shocks:

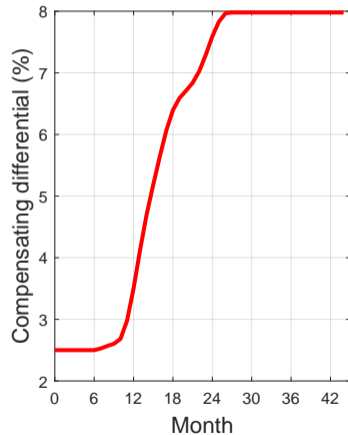
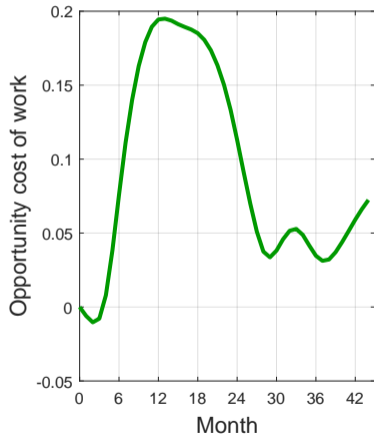
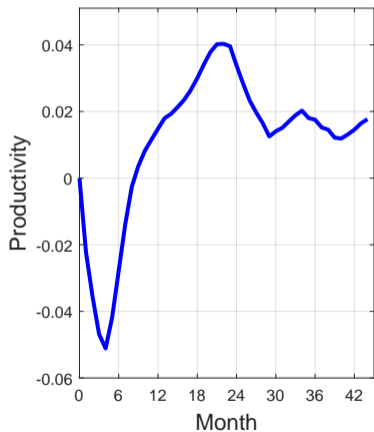
$$d_t = \sum_{s \in \{y, b, \bar{x}\}} \sum_{j=0}^t f_{sj}^d(\varepsilon_{s, t-j})$$

We allow f_{sj}^d to depend on size and sign of the shock.

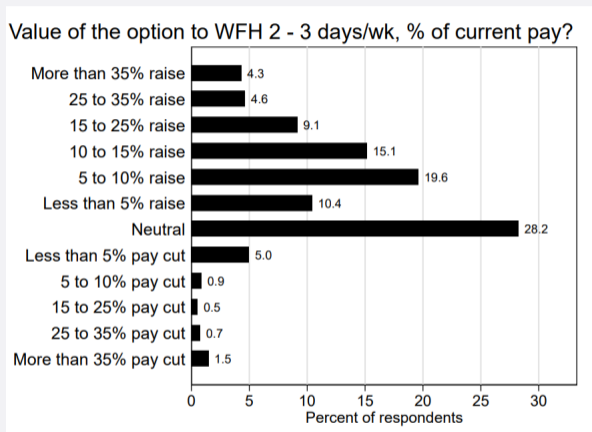
- Estimate $\{\varepsilon_{st}\}_{t=0}^T$ by NLLS using the data counterpart of $\{d_t\}_{t=0}^T$:

$$\{u_t, v_t, JFR_t, JFillR_t, MatchEff_t, EE_t, Y_t, w_t\}_{t=2020:01}^{2023:10}$$

Estimated paths of y , b and x



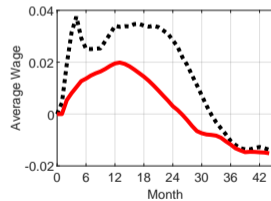
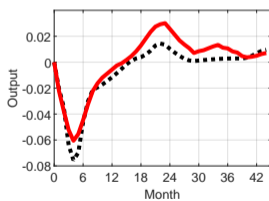
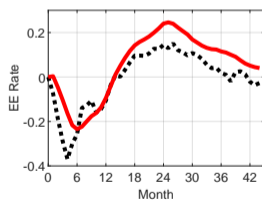
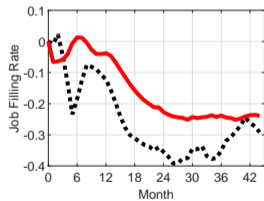
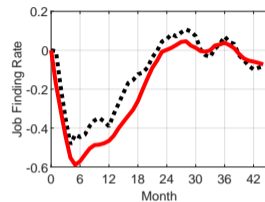
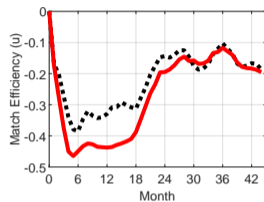
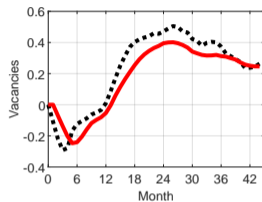
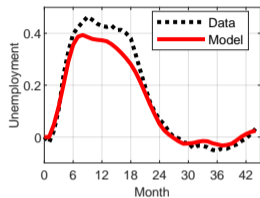
Size of x shock vs data on workers' valuation of WFH



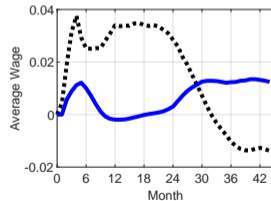
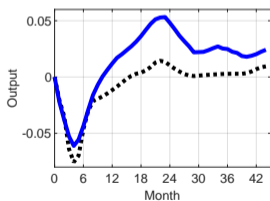
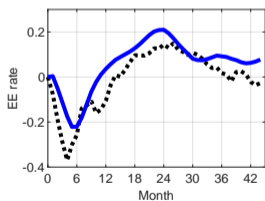
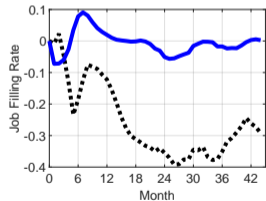
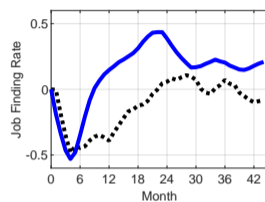
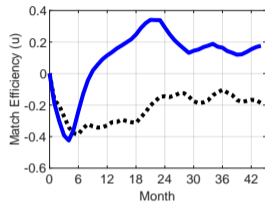
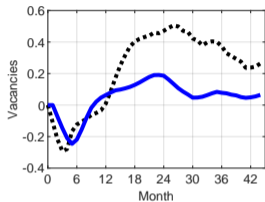
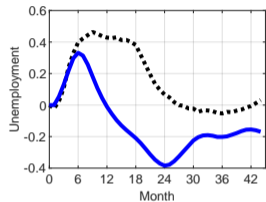
Source: Barrero, Bloom and Davis (2021)

Model Fit and Decompositions

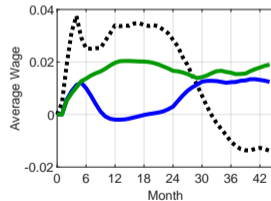
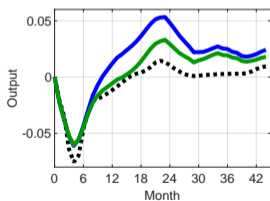
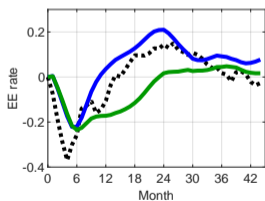
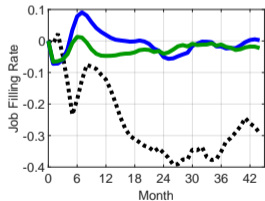
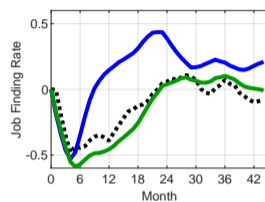
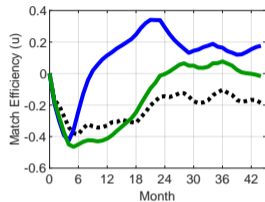
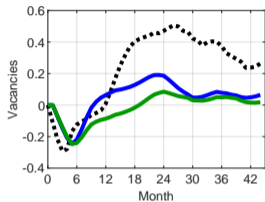
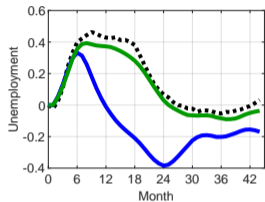
Model fit



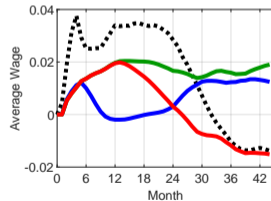
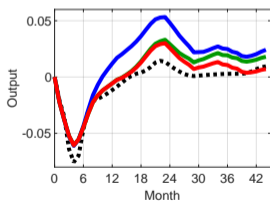
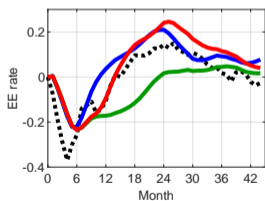
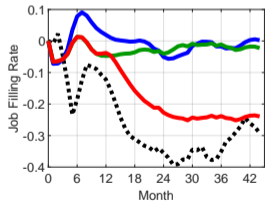
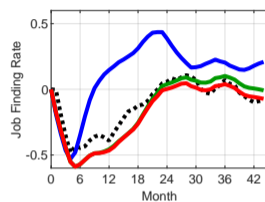
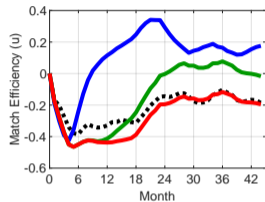
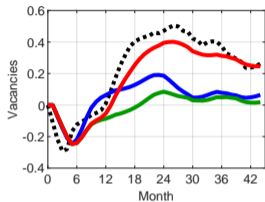
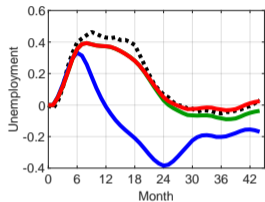
Decomposition: y



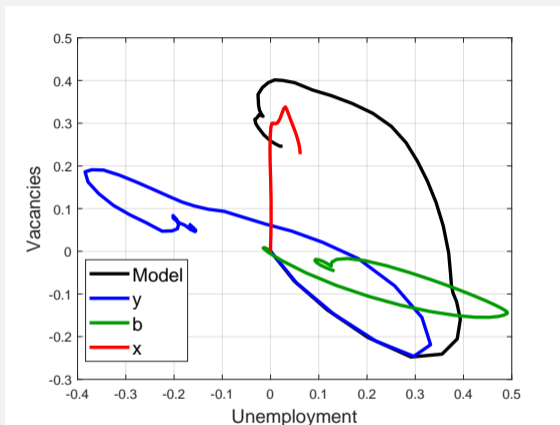
Decomposition: $y + b$



Decomposition: $y + b + x$

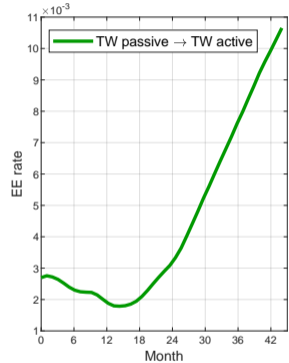
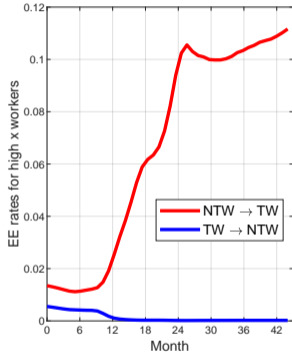
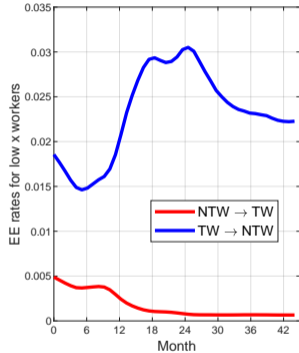


Beveridge Curve decomposition: $y + b + x$



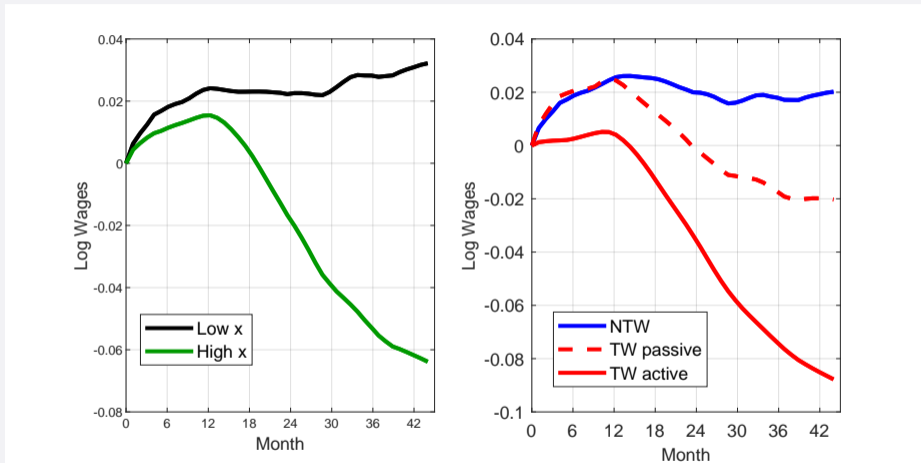
- Standard Beveridge curve from y , b
- x -shock generates the vertical shift

Reallocation



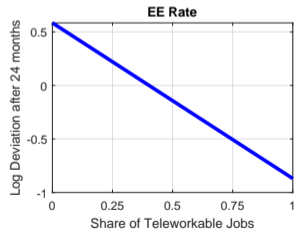
- **Reallocation** : high x workers look for teleworkable jobs and vice versa

Wages



- Shift to remote work has contained wage growth (evidence in *Barrero et al., 2022*)

Sectoral heterogeneity in the model



Looking ahead

- Understanding the post-pandemic labor market requires paying close attention to
 - shifts in workers' preference
 - on-the-job search
- Mechanism:
 - Amenity valuation shock → mismatch → quits ↑ + reallocation
 - Quits → vacancies ↑
 - Worsening vacancy pool → match efficiency ↓
- Quantitatively consistent with micro-evidence
- Given that share of remote jobs stabilized, bulk of reallocation has already taken place

References

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4. Crump R., Eusepi S., Giannoni M. and A. Şahin. “Inflation-Unemployment Trade-off Revisited: u^* in Covid Times,” 2022.
5. Hobijn B. and A. Şahin. “Maximum Employment and the Participation Cycle,” Jackson Hole Symposium, August 2021.
6. Hobijn B. and A. Şahin. “Missing Workers and Missing Jobs Since the Pandemic,” Boston Fed Employment Conference, 2022.