

The Geography of Job Creation and Job Destruction

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Motivation

- ▶ Unemployment rate differences across local labor markets are large and persistent ▶ Space
 - ▶ Swamp the variation studied extensively over the business cycle ▶ Time
 - ▶ Governments spend billions on local labor market policies
- ▶ Why? Policy implications?
- ▶ Needed:
 1. **Theory** quantitatively consistent with local labor market **facts**
 2. **Facts** on local labor markets to guide and discipline the **theory**
- ▶ This paper provides such facts and theory

Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets

Worker side

Firm side

Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets	Worker side
unemployment rate \uparrow	job finding \downarrow separation \uparrow

Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets	Worker side (known facts)
unemployment rate \uparrow	job finding \downarrow separation \uparrow

- ▶ Separation rates main driver of unemployment differences across space (Bilal, 2023)
- ▶ Job-finding rates main driver of unemployment fluctuations over the business cycle (Shimer, 2012; Fujita and Ramey, 2009; Elsby, Michaels, and Solon, 2009)

Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets	Worker side (known facts)	Firm side (new facts)
unemployment rate \uparrow	job finding \downarrow separation \uparrow	

- ▶ Missing facts: spatial differences in vacancy creation and vacancy filling by employers

Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets	Worker side (known facts)	Firm side (new facts)
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

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Contribution: Facts

- ▶ Local unemployment is an equilibrium outcome shaped by actions of workers and firms

Local labor markets	Worker side (known facts)	Firm side (new facts)
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

- ▶ Missing facts: spatial differences in vacancy creation and vacancy filling by employers
- ▶ Document these local labor market facts in Germany, United States, and United Kingdom

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- ▶ Missing facts: spatial differences in vacancy creation and vacancy filling by employers
- ▶ Document these local labor market facts in Germany, United States, and United Kingdom
- ▶ From facts to theory: empirical findings point to Diamond-Mortensen-Pissarides model

Contribution: Theory

- ▶ This paper: DMP with endogenous separations meets Rosen-Roback

Local labor markets	Worker side	Firm side
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

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- ▶ Model quantitatively matches facts at **worker** and **firm** sides

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Local labor markets	Worker side	Firm side
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

- ▶ Model quantitatively matches facts at **worker** and **firm** sides
- ▶ Additional fact: dominant role of job finding over the business cycle
 - ▶ On-the-job search reconciles different roles of job finding across space and time

Contribution: Theory

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Local labor markets	Worker side	Firm side
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

- ▶ Model quantitatively matches facts at **worker** and **firm** sides, and over **business cycle**
- ▶ Existing work focus on unemployment rate and worker side

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- ▶ Existing work focus on unemployment rate and worker side
 1. Spatial DMP models with exog. separations (Lkhagvasuren, 2012; Kline and Moretti, 2013)
 - ▶ Job finding rate accounts for all spatial unemployment differences

Contribution: Theory

- ▶ This paper: DMP with endogenous separations meets Rosen-Roback

Local labor markets	Worker side	Firm side
unemployment rate \uparrow	job finding \downarrow separation \uparrow	tightness \downarrow vacancy filling \uparrow

- ▶ Model quantitatively matches facts at **worker** and **firm** sides, and over **business cycle**
- ▶ Existing work focus on unemployment rate and worker side
 1. Spatial DMP models with exog. separations (Lkhagvasuren, 2012; Kline and Moretti, 2013)
 2. Novel mechanism: spatial employer sorting on vacancy filling rates (Bilal, 2023)
 - ▶ Productive firms sort into locations with high vacancy filling rates

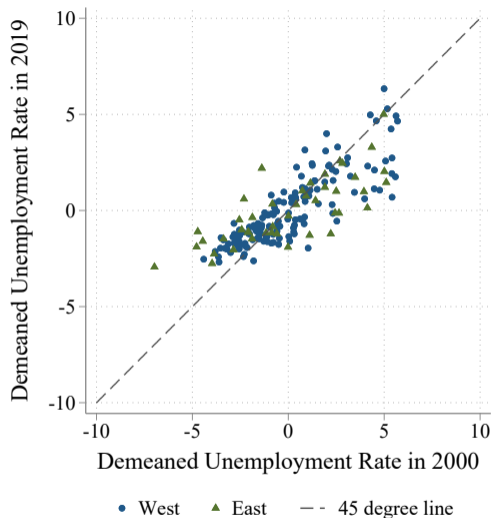
Facts on local labor markets

Germany

Data

- ▶ Data on local unemployment rates and vacancies from statistics department of German employment office
- ▶ Worker flows and labor market characteristics from Social Security data
- ▶ GDP data from German statistical office
- ▶ Data at county level aggregated to commuting zones (194 commuting zones)
- ▶ Data from 2000 until today (Social security data until 2017)

Local unemployment rates



Unemployment rate differences are large and persistent [▶ Time trend](#)

Sources of unemployment rate differences across space

- ▶ Steady-state unemployment condition

$$(1 - u_j) \times s_j = u_j \times f_j \quad \Longleftrightarrow \quad \frac{u_j}{1 - u_j} = \frac{s_j}{f_j}$$

- ▶ Take logs and allow for approx. error of the two-state decomposition

$$\underbrace{\log\left(\frac{u_j}{1 - u_j}\right)}_{\text{unemployment-employment ratio}} = \underbrace{\log(s_j)}_{\text{separation rate}} + \underbrace{(-\log(f_j))}_{\text{minus job finding rate}} + \underbrace{\epsilon_j}_{\text{approx. error}}$$

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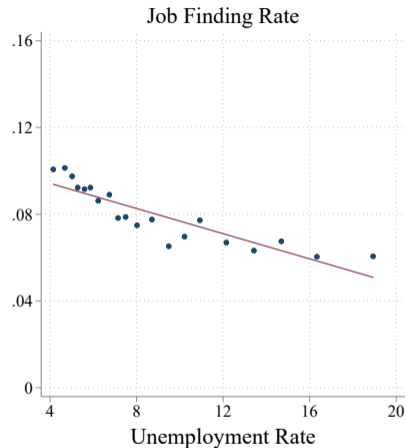
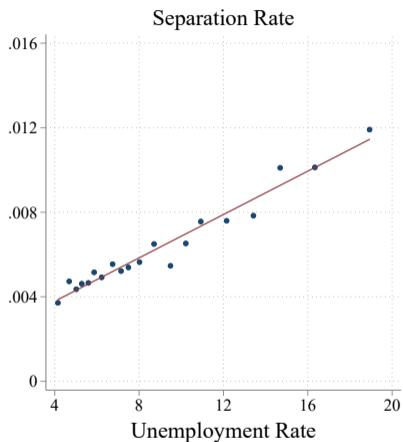
$$\underbrace{\log\left(\frac{u_j}{1 - u_j}\right)}_{\text{unemployment-employment ratio}} = \underbrace{\log(s_j)}_{\text{separation rate}} + \underbrace{(-\log(f_j))}_{\text{minus job finding rate}} + \underbrace{\epsilon_j}_{\text{approx. error}}$$

- ▶ Take the co-variance of both sides with the log UE ratio

$$\text{var}\left(\log\frac{u}{1-u}\right) = \text{cov}\left(\log\frac{u}{1-u}, \log s\right) + \text{cov}\left(\log\frac{u}{1-u}, -\log f\right) + \text{cov}\left(\log\frac{u}{1-u}, \epsilon\right)$$

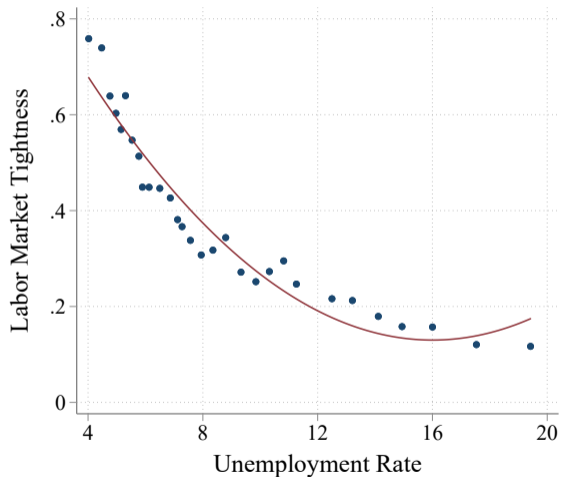
- ▶ The variance decomposition can be assessed with data on u, s, f

Separation and job-finding rate across German local labor markets



- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Separation rate differences account for most (64%) of local unemployment differences

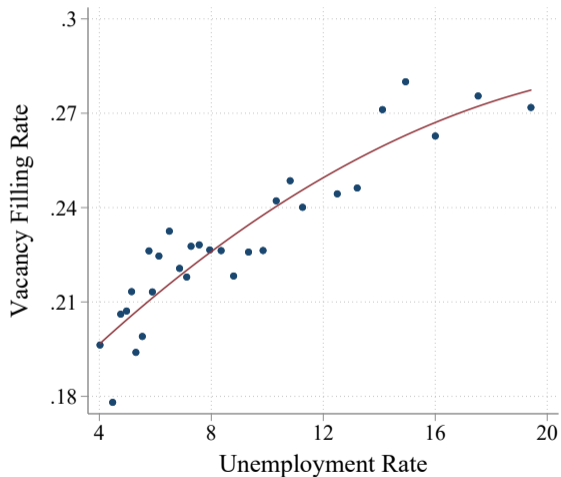
Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

► tightness \downarrow ► OJS adjusted

Local differences in vacancy behavior

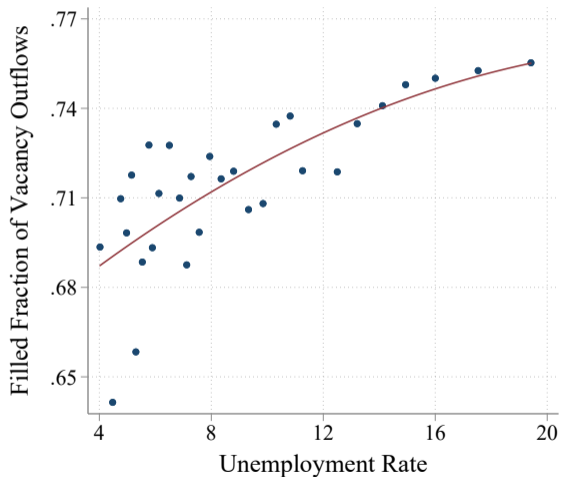


In labor markets with higher unemployment \uparrow :

▶ tightness \downarrow

▶ vacancy filling rate \uparrow

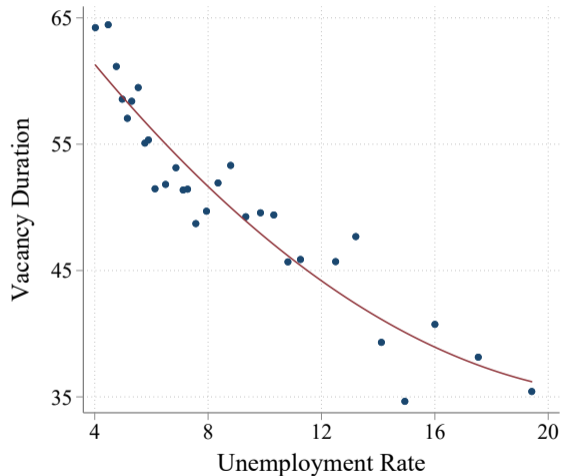
Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

- ▶ tightness \downarrow
- ▶ vacancy filling rate \uparrow
- ▶ fraction of vacancy being filled \uparrow

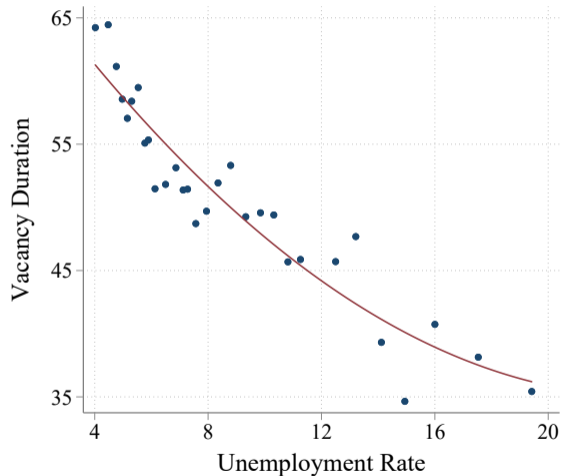
Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

- ▶ tightness \downarrow
- ▶ vacancy filling rate \uparrow
- ▶ fraction of vacancy being filled \uparrow
- ▶ vacancy duration \downarrow

Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

- ▶ tightness \downarrow
- ▶ vacancy filling rate \uparrow
- ▶ fraction of vacancy being filled \uparrow
- ▶ vacancy duration \downarrow
- ▶ In all measures, it is “easier” to fill a vacancy in high-unemployment locations

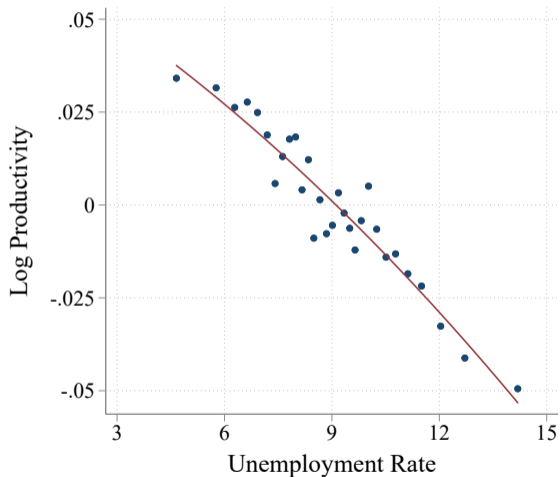
Accounting for composition differences across local labor market

	Labor Market Tightness		Vacancy Filling Rate	
	(1)	(2)	(3)	(4)
Unemployment Rate	-3.410*** (0.491)	-2.455*** (0.424)	0.631*** (0.081)	0.345*** (0.070)
Year FE	Yes	Yes	Yes	Yes
Controls		Yes		Yes
Observations	3492	3492	3492	3492
R-squared	0.64	0.72	0.61	0.67

Clustered standard errors (at the state level), *** $p < 0.01$

Observed relationships robust to controlling for labor market compositions
(including age, gender, education, occupation, industry)

Local labor productivity



High-unemployment locations are less productive

Same local labor markets facts in

United States [▶ Details](#)

United Kingdom [▶ Details](#)

Facts on local labor market differences

1. Local labor markets

- ▶ Unemployment differences are large and persistent
- ▶ High-unemployment locations are less productive

2. Worker flows

- ▶ Unemployment rate \uparrow , job-finding rate \downarrow , separation rate \uparrow
- ▶ Job separation rates more important than job-finding rates for unemployment differences

3. Firm's hiring and vacancies

- ▶ Labor markets with lower unemployment are tighter
- ▶ Vacancies are filled faster in high-unemployment locations

Baseline Model

Model: Mortensen-Pissarides meets Rosen-Roback

- ▶ Locations are heterogeneous, indexed by $j \in \mathcal{J}$
 - ▶ local productivity A_j
 - ▶ cost of living c_j , incurred regardless of employment status

Model: Mortensen-Pissarides meets Rosen-Roback

- ▶ Locations are heterogeneous, indexed by $j \in \mathcal{J}$
 - ▶ local productivity A_j
 - ▶ cost of living c_j , incurred regardless of employment status
- ▶ Within each location, DMP with endogenous separations:
 - ▶ Match output $A_j \varepsilon$
 - ▶ Idiosyncratic match-specific productivity shock $\varepsilon \sim F$
 - ▶ Separations [▶ Details](#)
 - ▶ Exogenous separation probability δ
 - ▶ Endogenous separations are individually efficient
 - ▶ Unemployed workers receive flow utility z
 - ▶ Employed workers receive Nash-bargained wage w_j

Vacancy posting and matching

- ▶ Labor markets are local and frictional: search and matching within each location

$$m = \mu u^\alpha v^{1-\alpha} \quad \theta = \frac{v}{u}$$

- ▶ Worker contact rate $f(\theta)$ and firm contact rate $q(\theta)$
- ▶ Free entry at per-period vacancy posting cost κ

Bellman equations

- ▶ Unemployed worker in location j

$$V_j^u = z - c_j + \beta \left(V_j^u + f(\theta_j) (1 - \delta) \overbrace{\mathbb{E} [V_j^e(\varepsilon') - V_j^u]^+}^{\text{viable match}} \right)$$

- ▶ Employed worker in location j

$$V_j^e(\varepsilon) = w_j(\varepsilon) - c_j + \beta \left(V_j^u + (1 - \delta) \overbrace{\mathbb{E} [V_j^e(\varepsilon') - V_j^u]^+}^{\text{no separation}} \right)$$

- ▶ Producing job in location j

$$V_j^p(\varepsilon) = A_j \varepsilon - w_j(\varepsilon) + \beta (1 - \delta) \overbrace{\mathbb{E} [V_j^p(\varepsilon')]^+}^{\text{no separation}}$$

- ▶ Vacant job in location j

$$V_j^v = -\kappa + \beta q(\theta_j) (1 - \delta) \overbrace{\mathbb{E} [V_j^p(\varepsilon')]^+}^{\text{viable match}}$$

Equilibrium within a location

- ▶ Job creation equation

$$\kappa = \beta q(\theta_j) (1 - \delta) (1 - \eta) \mathbb{E}_{\varepsilon'} [S_j(\varepsilon')]^+$$

- ▶ Job destruction equation

$$0 = A_j \varepsilon_j^R - z + \beta (1 - \delta) (1 - \eta f(\theta_j)) \mathbb{E}_{\varepsilon'} [S_j(\varepsilon')]^+$$

- ▶ Determine equilibrium tightness θ_j and separation cutoff ε_j^R

- ▶ Separation rate: $\pi_j^{eu} = 1 - (1 - \delta) \left(1 - F(\varepsilon_j^R)\right)$

- ▶ Job-finding rate: $\pi_j^{ue} = f(\theta_j) (1 - \delta) \left(1 - F(\varepsilon_j^R)\right)$

- ▶ Vacancy filling rate: $\pi_j^{vp} = q(\theta_j) (1 - \delta) \left(1 - F(\varepsilon_j^R)\right)$

Spatial equilibrium

- ▶ Spatial equilibrium à la Rosen (1979)-Roback (1982): workers are freely mobile
- ▶ Equilibrium cost of living $\{c_j\}_{j \in \mathcal{J}}$ equalizes unemployed value across space

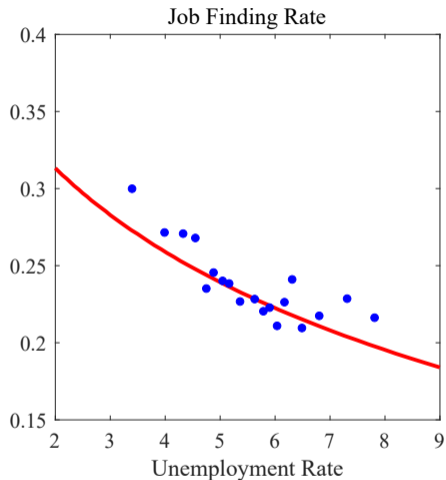
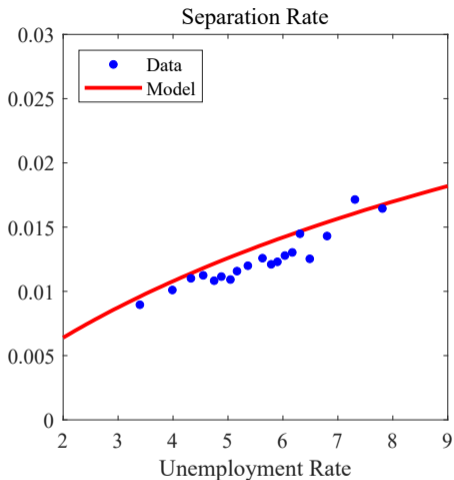
$$V_j^u = \underline{V}$$

- ▶ Free entry makes firms indifferent across local labor markets
- ▶ Note: with Hosios condition satisfied, the model is constrained efficient. [▶ Details](#)

Model calibration

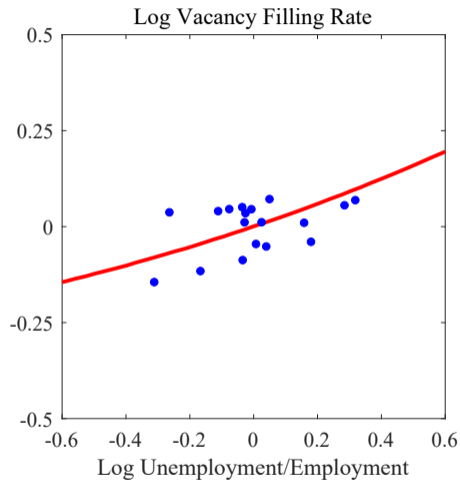
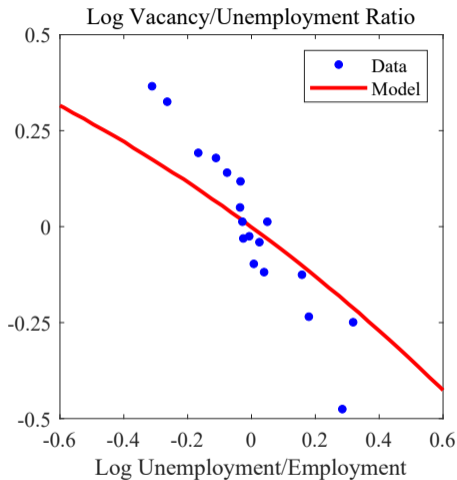
- ▶ Model calibrated to U.S. labor market at monthly frequency
- ▶ Discount factor β and exogenous separation rate δ set to match external targets
- ▶ Impose Hosios condition and calibrate to median unemployment location ($A = 1$)
 1. Idiosyncratic shocks, matching efficiency, and vacancy posting cost directly related to separation, job-finding, and job-filling rate
 2. Outside option, bargaining power, and location productivity dispersion $[A_{\min}, A_{\max}]$ match support of output per worker and unemployment rates
- ▶ Assess induced differences in local labor market outcomes by varying location productivity $A_j \in [A_{\min}, A_{\max}]$

Worker flow rates



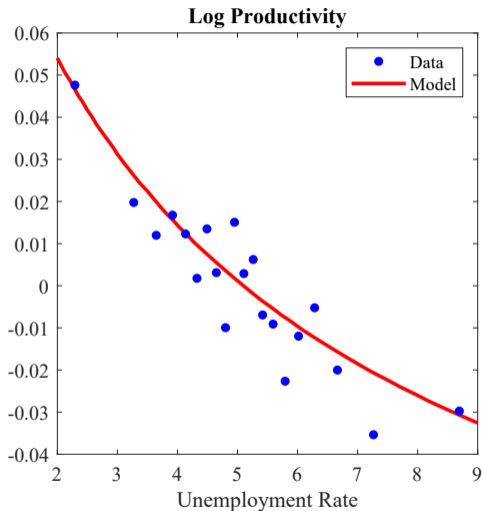
- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Sep. rate differences account for (71% in data, 69% in model) of local unemp. differences

Local differences in vacancy behavior



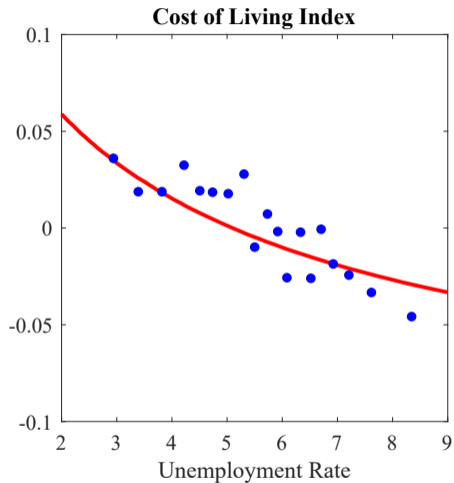
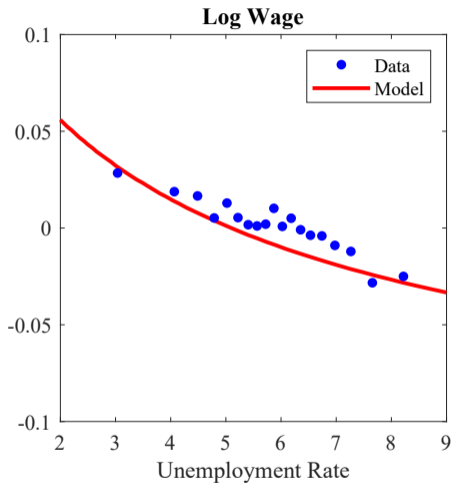
Unemployment \uparrow , V/U ratio \downarrow , vacancy duration \downarrow [▶ Table](#)

Local labor productivity



High-unemployment locations are less productive

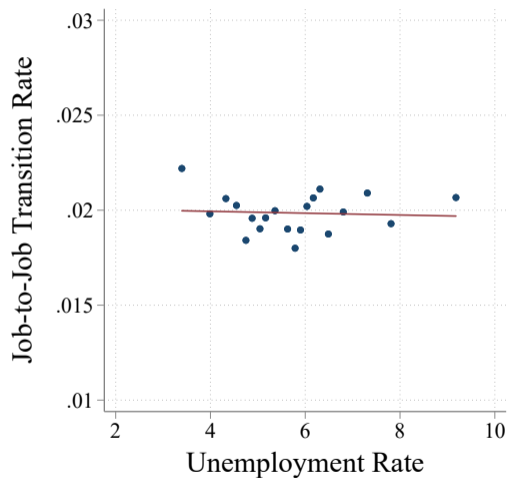
Wages and local cost of living



Unemployment \uparrow , Wages \downarrow , Cost of Living \downarrow [▶ Robustness](#)

Adding on-the-job search

Job-to-job mobility across local labor markets



Job-to-job rates vary little in the cross section of local labor markets

▶ Germany

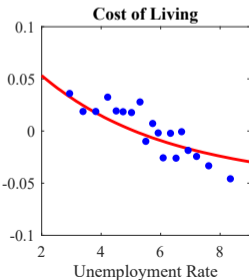
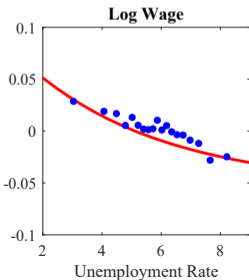
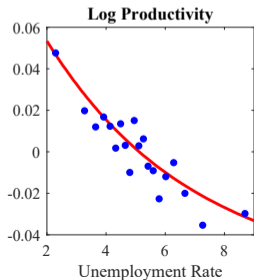
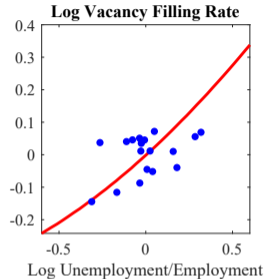
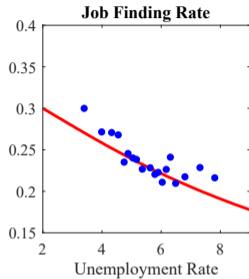
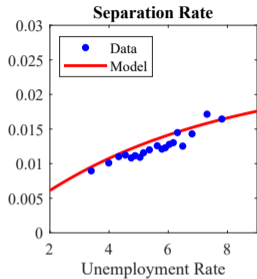
Adding on-the-job search to the model

- ▶ Share of employed workers searching on the job ϕ

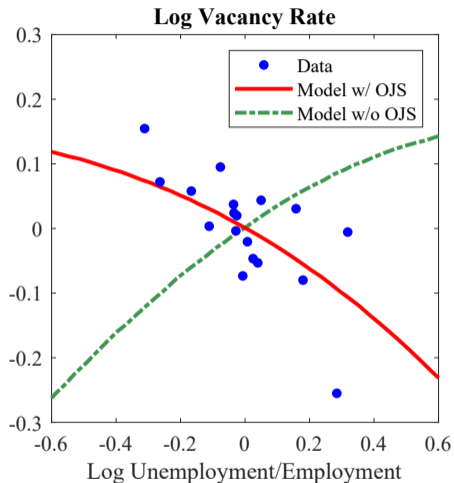
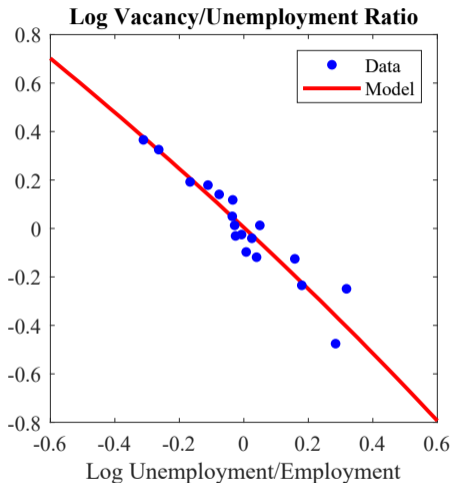
$$m = \mu s^\alpha v^{1-\alpha} \text{ with } s = u + \phi(1 - u)$$

- ▶ Job acceptance with probability χ_j
- ▶ The same calibration strategy as for the baseline model [▶ Table](#)
- ▶ All previous results go through
- ▶ In addition, adding on-the-job search restores empirical Beveridge curve in the model

Model with OJS



Model with OJS



Spatial Beveridge curve: Unemployment \uparrow , Vacancy \downarrow

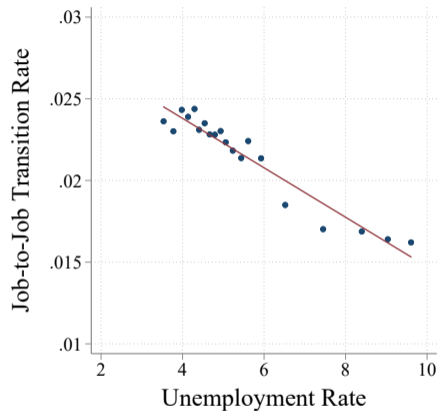
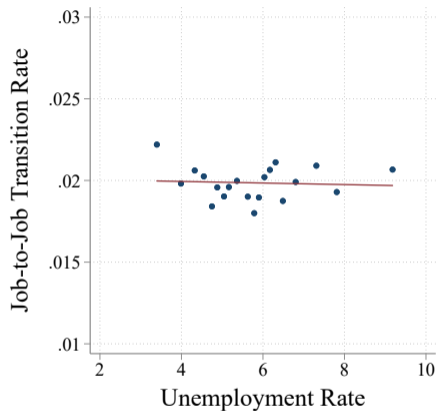
Business cycle dynamics

- ▶ Untargeted business-cycle dynamics as a “test” of spatial labor market model
- ▶ Simulate model with standard aggregate AR(1) productivity process
- ▶ Standard deviation of detrended log quarterly average series (HP filter with $\lambda = 1,600$)

	u	v	v/u	π^{ue}	π^{eu}	ρ
Data	0.125	0.139	0.259	0.083	0.060	0.013
Model	0.138	0.133	0.243	0.099	0.075	0.013

- ▶ Model matches high labor market volatility over the business cycle
- ▶ Job-finding fluctuations account for 54.4% of unemployment fluctuations in the model
- ▶ Fujita-Ramey (2009): job-finding accounts for 50-60% of unemployment fluctuations in US

Job-to-job mobility over time and space



- ▶ More volatile job-to-job over the business cycle than across space and model matches it
- ▶ Procyclical worker reallocation amplifies role of job finding and dampens role of separations

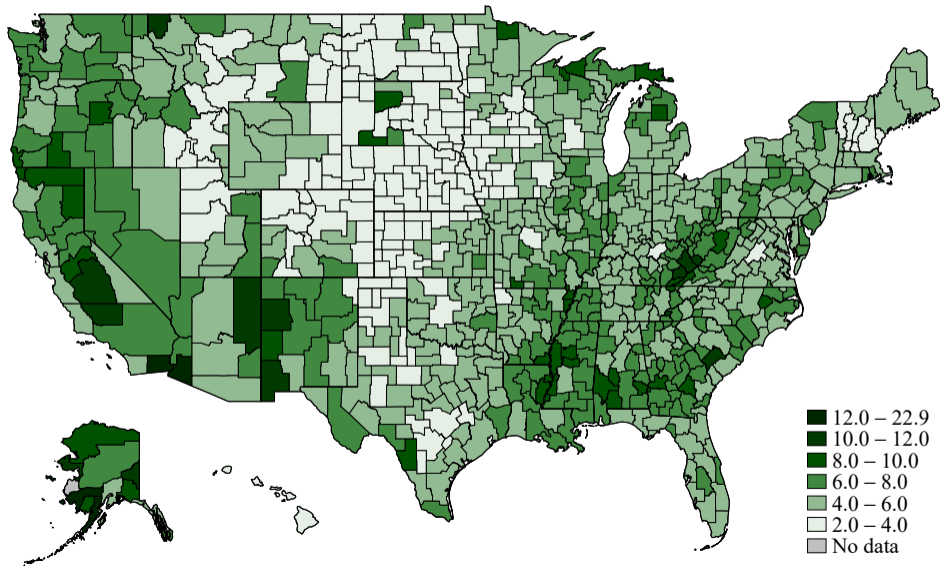
Conclusions

- ▶ Large and persistent spatial unemployment differences call for economists' attention (policy-makers are busy addressing them)
- ▶ Provide an empirically consistent theory to study local labor market differences
 - ▶ Document new facts on the geography of vacancy creation and vacancy filling
 - ▶ Spatial DMP model with endogenous separations quantitatively matches local labor market facts on job finding, separation, and vacancy filling rates
 - ▶ On-the-job search reconciles different roles of separation and job finding over space and time

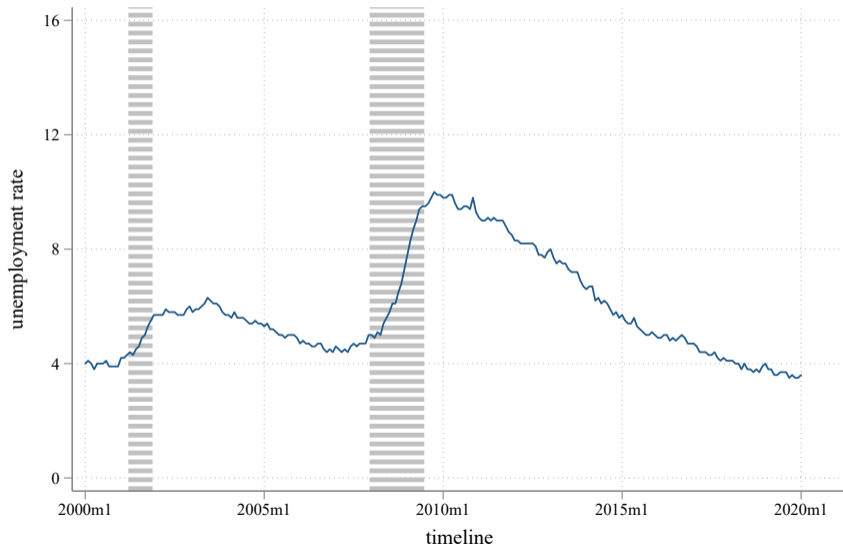
The Geography of Job Creation and Job Destruction

Appendix

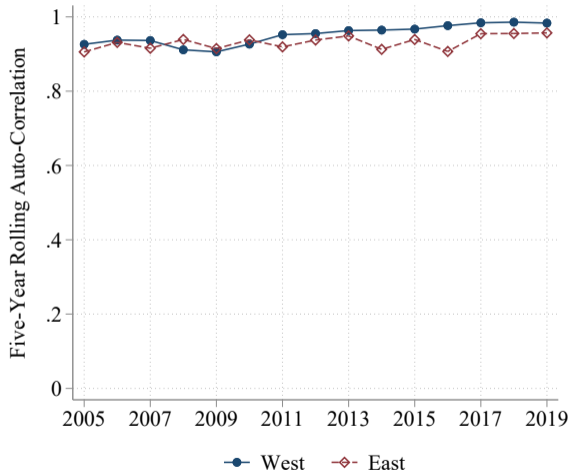
Unemployment rates in United States (2015) [▶ Back](#)



Unemployment rates in United States (2000–2019) [▶ Back](#)

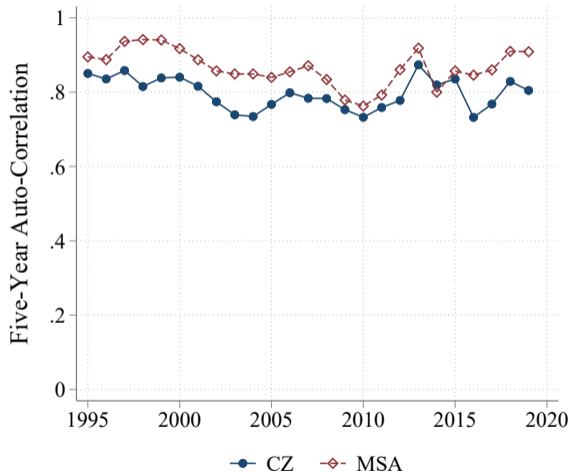


Persistence of local unemployment



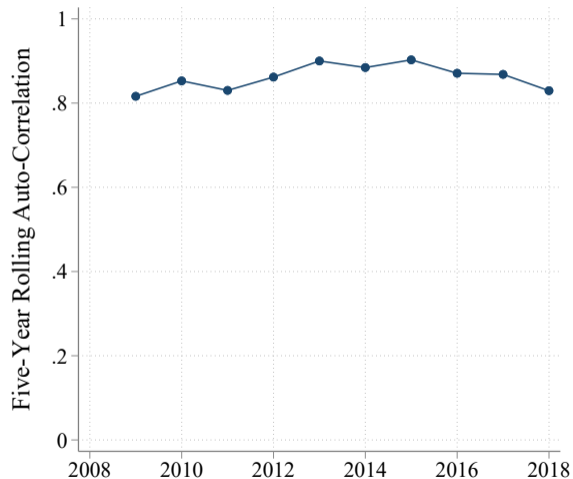
- ▶ High persistence of local unemployment rate regardless of time period
- ▶ 5-year auto-correlation of local unemployment rate is
 - ▶ above 0.9 in Germany [▶ Back](#)

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Persistence of local unemployment



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- ▶ 5-year auto-correlation of local unemployment rate is
 - ▶ above 0.9 in Germany [▶ Back](#)
 - ▶ around 0.8 in U.S. [▶ Back](#)
 - ▶ 0.8 ~ 0.9 in U.K. [▶ Back](#)

Three-state decomposition

- ▶ Consider a three-state model of unemployment dynamics such that $e + u + n = 1$
- ▶ Steady state conditions for u and n are

$$0 = e \times \pi^{eu} - u \times \pi^{ue} + n \times \pi^{nu} - u \times \pi^{un}$$

$$0 = e \times \pi^{en} - n \times \pi^{ne} + u \times \pi^{un} - n \times \pi^{nu}$$

- ▶ Steady state unemployment rate in the three-state model \tilde{u} satisfies

$$\frac{\tilde{u}}{1 - \tilde{u}} = \frac{\pi^{en}\pi^{nu} + \pi^{ne}\pi^{eu} + \pi^{nu}\pi^{eu}}{\pi^{un}\pi^{ne} + \pi^{nu}\pi^{ue} + \pi^{ne}\pi^{ue}}.$$

- ▶ To capture the overall contribution from flows into or out of, define nonparticipation

$$\pi^n := \frac{\pi^{en}\pi^{nu} + \pi^{ne}\pi^{eu} + \pi^{nu}\pi^{eu}}{\pi^{un}\pi^{ne} + \pi^{nu}\pi^{ue} + \pi^{ne}\pi^{ue}} / \frac{\pi^{eu}}{\pi^{ue}}.$$

Three-state decomposition (cont'd)

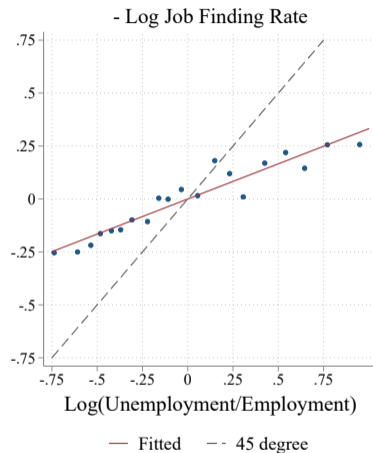
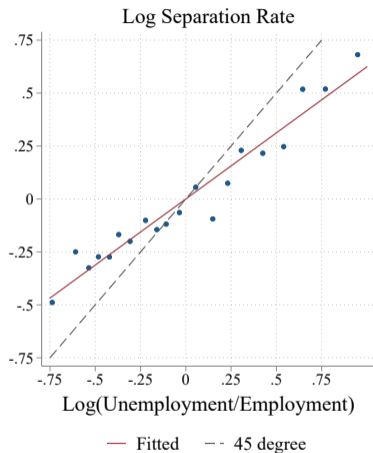
$$\begin{aligned}\text{var}\left(\log\frac{\tilde{u}}{1-\tilde{u}}\right) &= \text{cov}\left(\log\frac{\tilde{u}}{1-\tilde{u}}, \log\pi^{eu}\right) + \text{cov}\left(\log\frac{\tilde{u}}{1-\tilde{u}}, -\log\pi^{ue}\right) \\ &+ \text{cov}\left(\log\frac{\tilde{u}}{1-\tilde{u}}, \log\pi^n\right) + \text{cov}\left(\log\frac{\tilde{u}}{1-\tilde{u}}, \varepsilon\right).\end{aligned}$$

	separation	job-finding	nonparticipation	residual
Germany	60.6%	32.8%	0.6%	5.9%
United States	72.0%	32.8%	-5.7%	0.9%

Additional facts on local labor markets

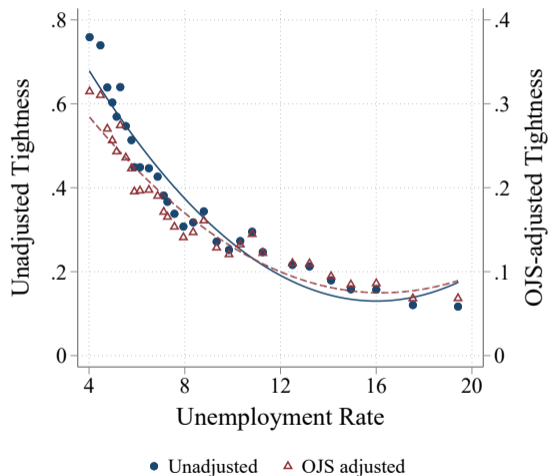
Germany

Sources of unemployment rate differences



- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Separation rate differences account for most (64%) of local unemployment differences

OJS-adjusted tightness

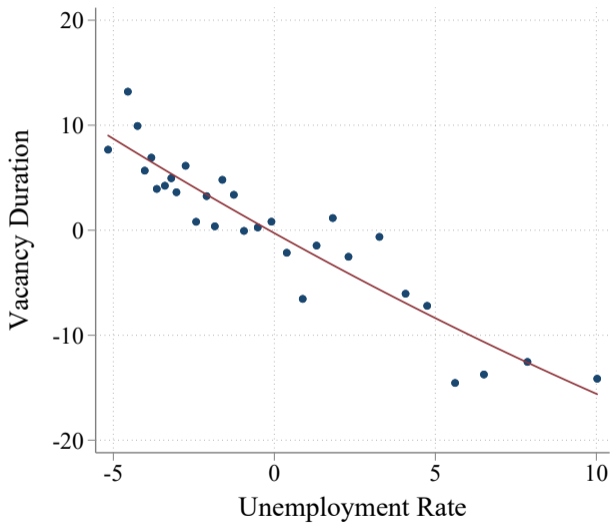


- ▶ Construct effective tightness as

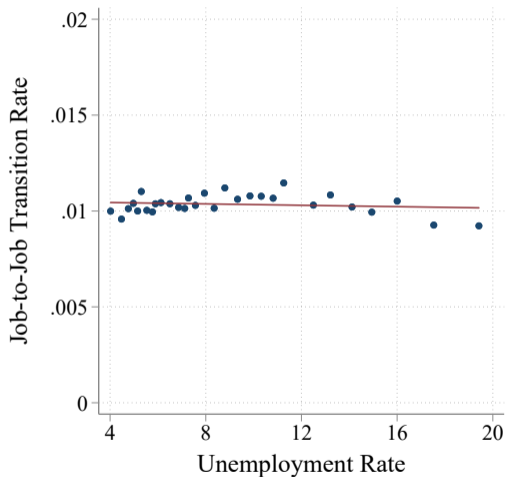
$$\tilde{\theta} = \frac{v}{u + s \times e}$$

- ▶ We estimate s using information on fraction of hires that came from E v.s. U
- ▶ Low-unemployment labor markets have more vacancies per effective searcher

Controlling for occupation fixed effects



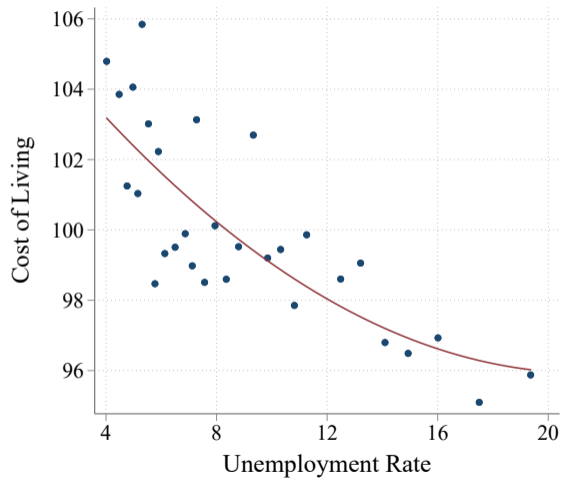
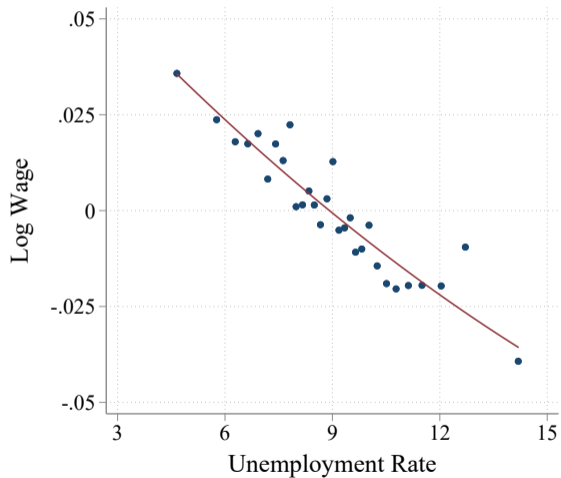
Job-to-job mobility and worker reallocation



Job-to-job rates vary little in the cross section of local labor markets

[▶ Back](#)

Wages and cost of living



Additional facts on local labor markets

United States

Data

- ▶ Data at Metropolitan Statistical Areas (MSA) level from 2000 until today
- ▶ Unemployment rates from Local Area Unemployment Statistics (LAUS)
- ▶ Vacancy data from Job and Labor Turnover Survey (JOLTS) for 18 largest MSAs (40% of employment)
- ▶ Worker flow data from Current Population Survey (CPS) (182 MSAs)
- ▶ Labor market characteristics from Quarterly Workforce Indicators (QWI)

Local unemployment rates

Figure: Metropolitan Statistical Areas

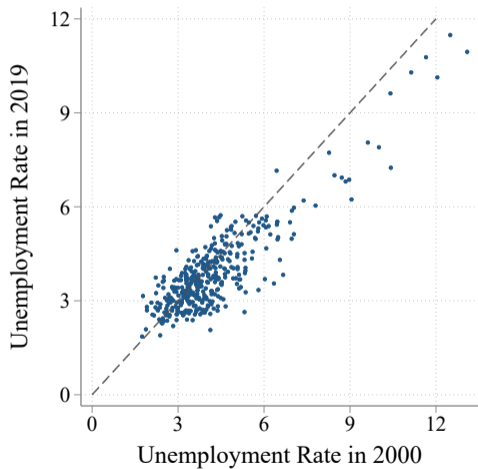
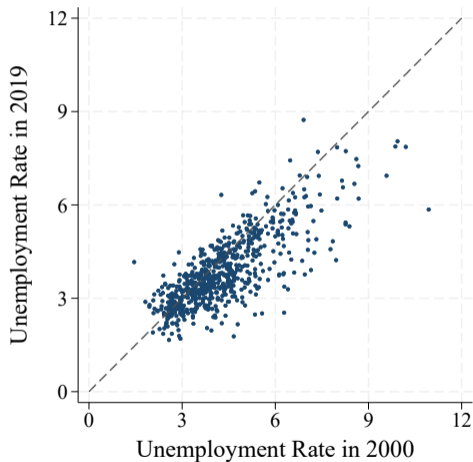
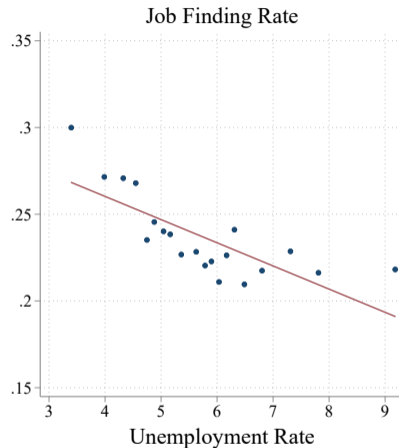
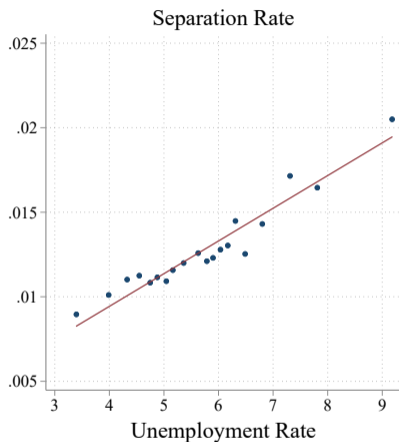


Figure: Commuting Zones



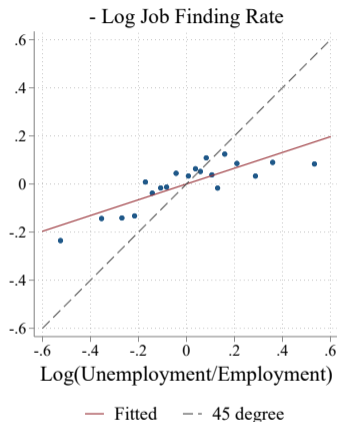
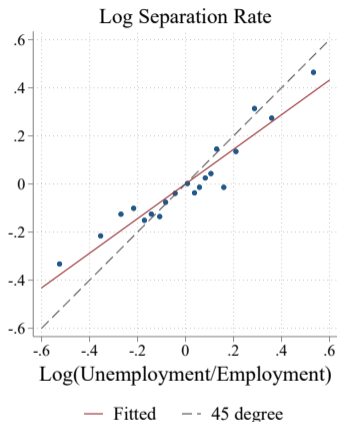
Unemployment rate differences are large and persistent [▶ Time trend](#)

Separation and job-finding rate across U.S. local labor markets



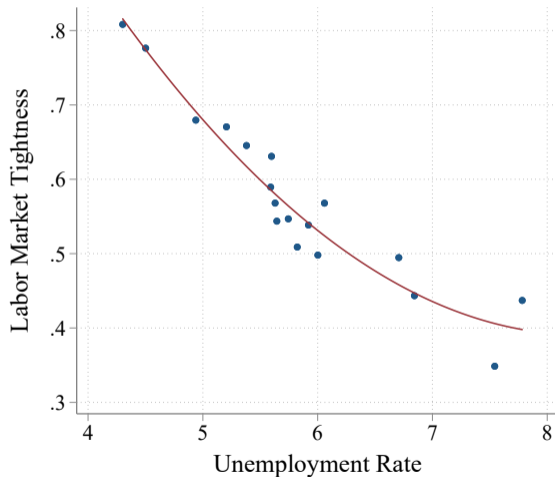
- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Separation rate differences account for most (71%) of local unemployment differences

Sources of unemployment rate differences



- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Separation rate differences account for most (71%) of local unemployment differences

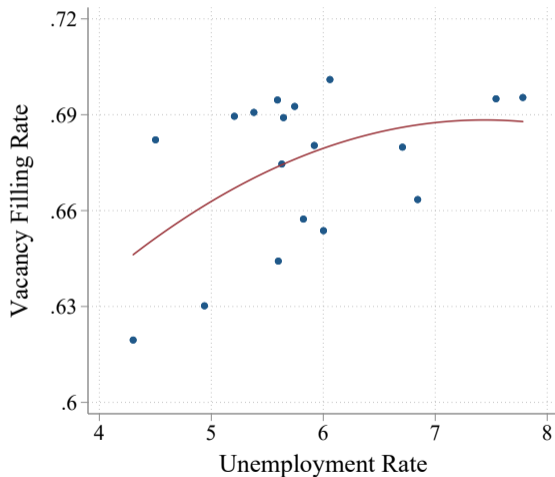
Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

► tightness \downarrow

Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

▶ tightness \downarrow

▶ vacancy filling rate \uparrow

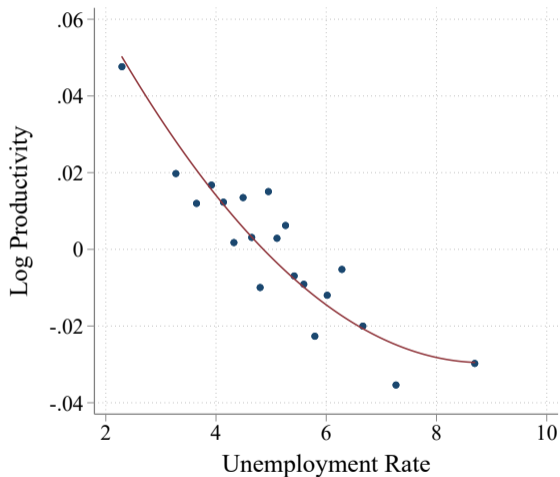
Accounting for composition differences across local labor market

	Labor Market Tightness		Vacancy Filling Rate	
	(1)	(2)	(3)	(4)
Unemployment Rate	-8.678*** (1.118)	-6.187*** (1.615)	0.890** (0.361)	0.652*** (0.161)
Year FE	Yes	Yes	Yes	Yes
Controls		Yes		Yes
Observations	337	337	337	337
R-squared	0.87	0.89	0.81	0.88

Clustered standard errors (at the MSA level), ** $p < 0.05$, *** $p < 0.01$

Observed relationships robust to controlling for labor market compositions
(including age, gender, education, industry) [▶ Model](#)

Local labor productivity



High-unemployment locations are less productive [▶ Back](#)

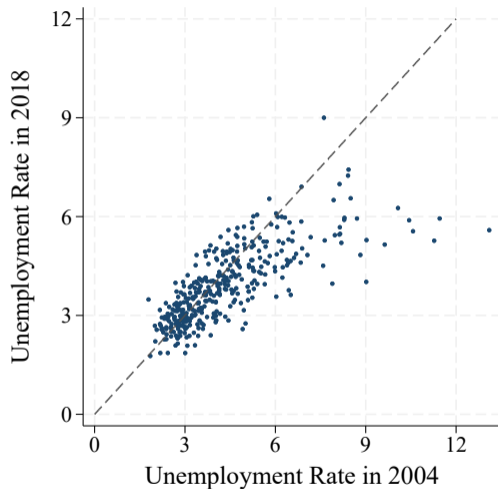
Additional facts on local labor markets

United Kingdom

Data

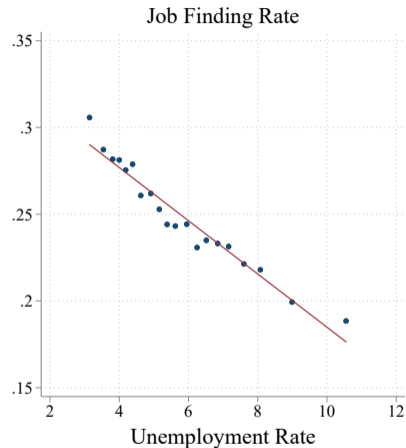
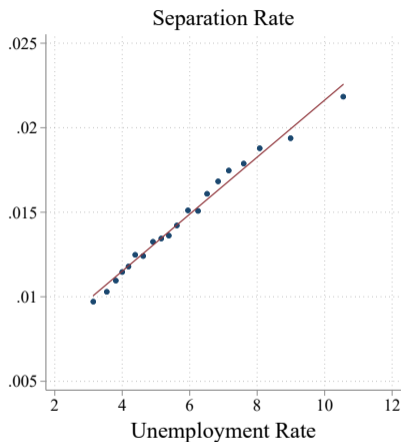
- ▶ Unemployment and GDP data from National Statistical Office
- ▶ Vacancy and worker flow data from employment office
- ▶ Worker flow data based on unemployment insurance claimant data
- ▶ Data at the local authority district level (378 local authority districts)
- ▶ Vacancy data for 2005/2006 other data from 2004 until today

Local unemployment rates



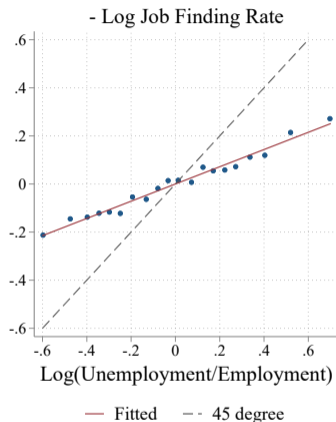
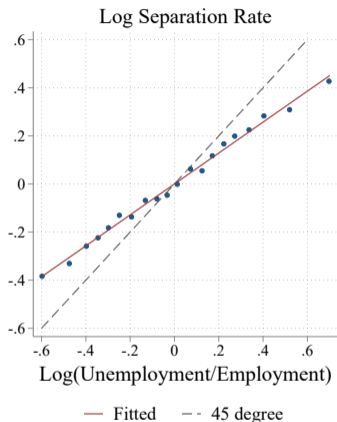
Unemployment rate differences are large and persistent [▶ Time trend](#)

Separation and job-finding rate across U.K. local labor markets



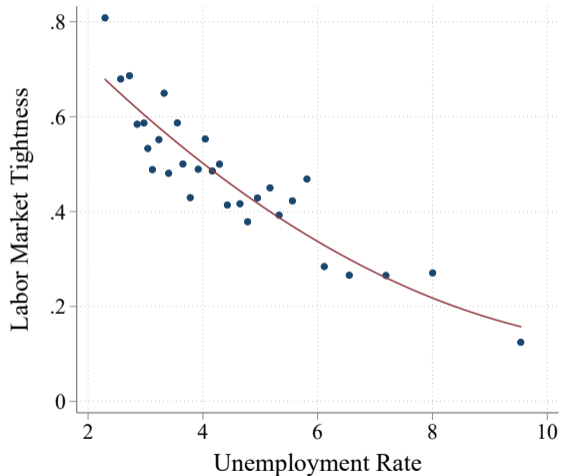
- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow
- ▶ Separation rate differences account for most (64%) of local unemployment differences

Sources of unemployment rate differences



- ▶ Unemployment \uparrow , separation rate \uparrow , job finding rate \downarrow [▶ Imputation](#)
- ▶ Separation rate differences account for most (64%) of local unemployment differences

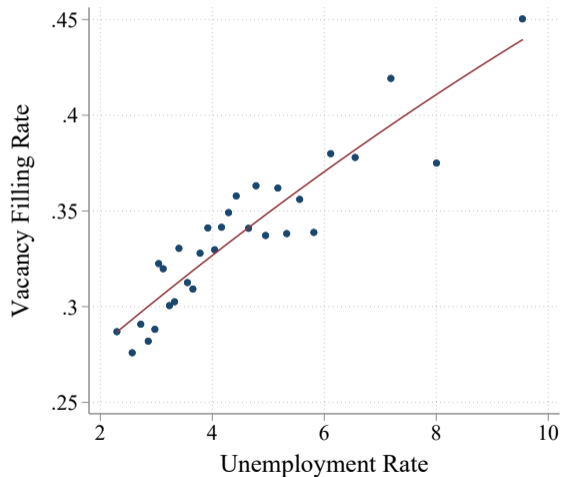
Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

► tightness \downarrow

Local differences in vacancy behavior



In labor markets with higher unemployment \uparrow :

▶ tightness \downarrow

▶ vacancy filling rate \uparrow

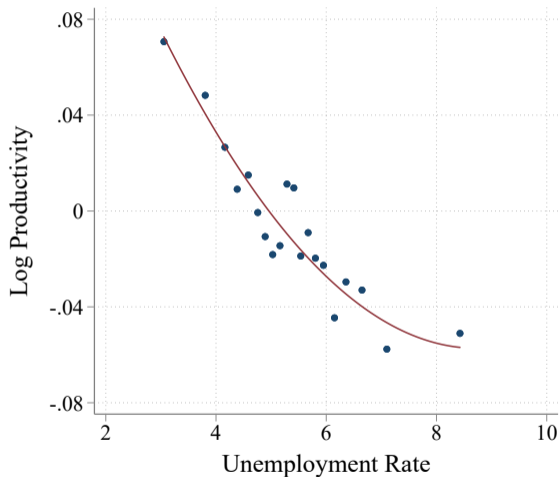
Accounting for composition differences across local labor markets

	Labor Market Tightness		Vacancy Filling Rate	
	(1)	(2)	(3)	(4)
Unemployment Rate	-7.594*** (1.198)	-9.386*** (1.510)	2.138*** (0.371)	2.393*** (0.345)
Controls		Yes		Yes
Observations	378	378	378	378
R-squared	0.28	0.43	0.33	0.51

Clustered standard errors (at the region level), *** $p < 0.01$

Observed relationships robust to controlling for labor market compositions
(including age, gender, occupation, industry)

Local labor productivity



High-unemployment locations are less productive [▶ Back](#)

U.K. worker flows imputation

- ▶ The fraction of unemployed workers in local authority district j that are JSA claimants:

$$\Omega_j = \frac{\text{JSA claimants in LAD}_j}{\text{unemployed workers in LAD}_j}.$$

- ▶ Assume JSA inflows and JSA outflows represent a fraction Ω_j of the EU and UE flows
- ▶ EU flows and UE flows are imputed as

$$\text{EU flows}_j = \frac{\text{JSA inflows}_j}{\Omega_j}, \quad \text{UE flows}_j = \frac{\text{JSA outflows}_j}{\Omega_j}.$$

- ▶ The flow rates are computed as usual, by dividing flows by stocks, i.e.,

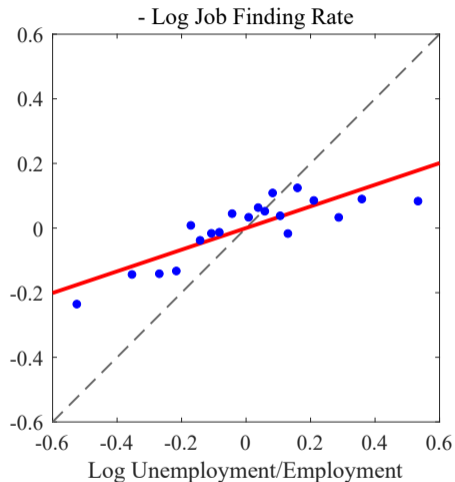
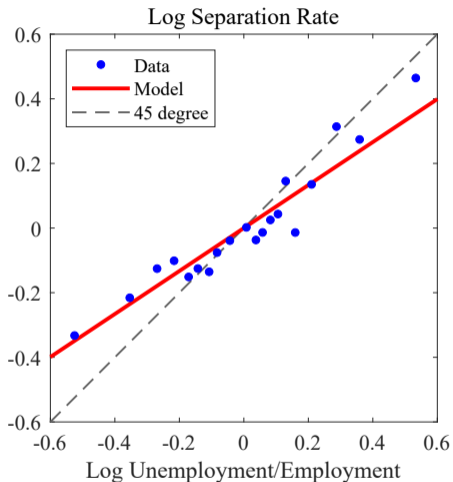
$$\text{EU rate}_j = \frac{\text{EU flows}_j}{\text{E stock}_j}, \quad \text{UE rate}_j = \frac{\text{UE flows}_j}{\text{U stock}_j}.$$

Additional Model Discussion

Details on separations decision

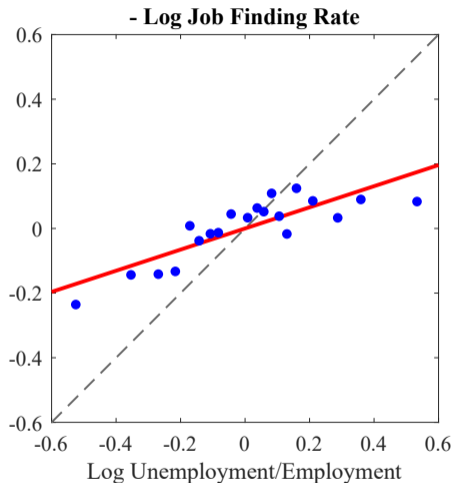
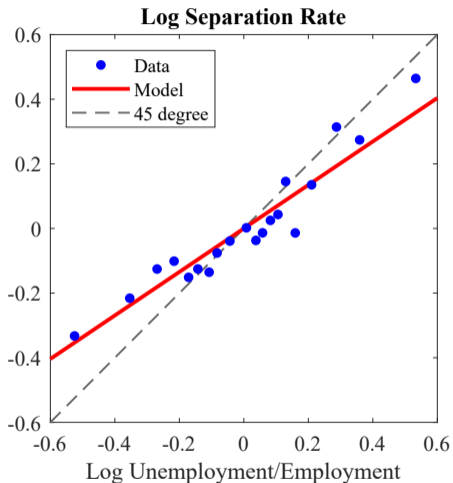
- ▶ Match specific productivity shock ε
- ▶ Probability to receive shock λ
- ▶ Shock drawn from uniform distribution $[0, 2]$ otherwise $\varepsilon = 1$
- ▶ Present value shock tractable version of persistent shock
- ▶ Kurtosis of shocks consistent with empirical evidence
- ▶ Efficient separation decision follows cutoff rule $\varepsilon < R_j^*$

Baseline Model: Sources of unemployment rate differences



Separation rate differences account for most of local unemployment differences
(71% in data, 69% in model)

Model with OJS



Separation rate differences account for most of local unemployment differences

Efficiency

- ▶ Within a local labor market: standard Hosios condition
- ▶ Across local labor markets: social planner chooses a reallocation of unemployed workers

$$\max_{\{N_j^u\}_{j \in \mathcal{J}}} N_j^u \tilde{V}_j^u + N_j^e \tilde{V}_j^e - \frac{1}{1-\beta} g_j (N_j^u + N_j^e) + N_j^e V_j^p$$

subject to

$$\sum_{j \in \mathcal{J}} N_j^u = N^u.$$

The interior first-order condition is

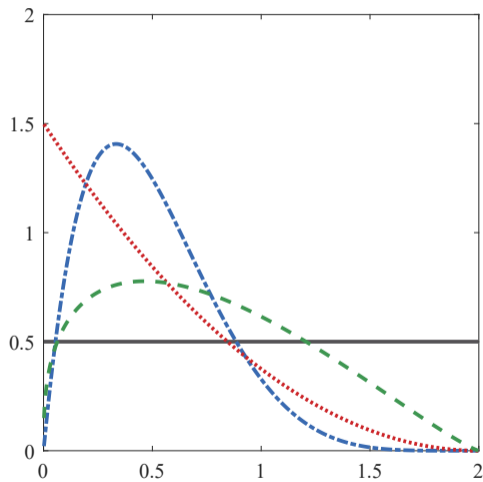
$$\tilde{V}_j^u - \frac{1}{1-\beta} g_j' (N_j^u + N_j^e) = \lambda,$$

- ▶ Competitive housing sector: $c_j = g_j' (N_j)$

Efficiency and local labor market differences

- ▶ Efficiency properties of DMP framework well understood
- ▶ Congestion externality and thick market externality two offsetting effects
- ▶ Efficiency prevails under Hosios condition and imposed in baseline calibration
- ▶ Large differences in local labor market outcomes can be consistent with efficient allocation
- ▶ Policy should address deviations from Hosios condition rather than differences in local labor market outcomes

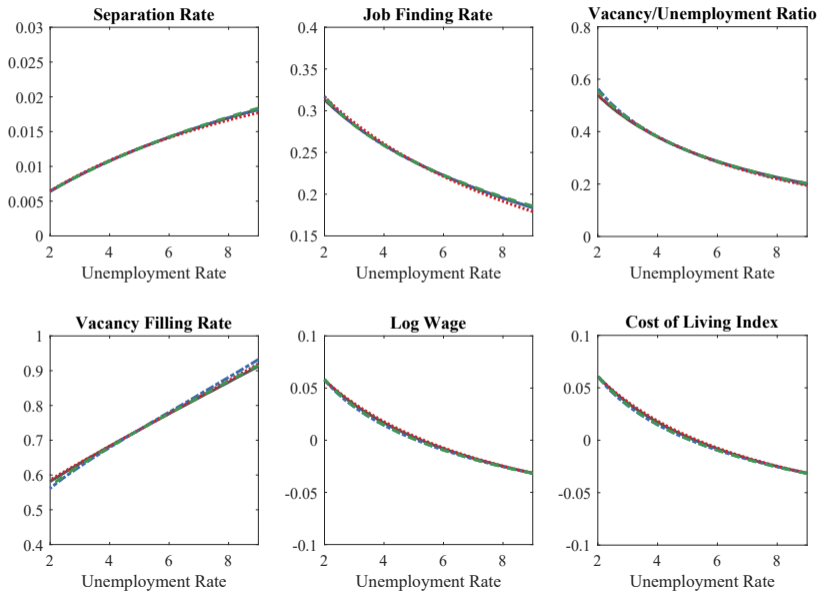
Alternative distributional assumptions



Use Beta (α, β) distribution to approximate commonly used choices:

- ▶ $\alpha = \beta = 1$ - uniform in Mortensen and Pissarides (1994), our benchmark
- ▶ $\alpha = 2, \beta = 6$ - Log-Normal in Den Haan, Ramey, and Watson (2000)
- ▶ $\alpha = 1.36, \beta = 2.19$ - Beta in Bilal (2022)
- ▶ $\alpha = 1, \beta = 3$ - Pareto in Fournier (2022)

Model predictions under alternative distributional assumptions



Calibration: Baseline model

	Symbol	Value
Discount factor	β	0.997
Exogenous separation	δ	0.004
Idiosyncratic shock	λ	0.0814
Matching efficiency	m	0.4371
Vacancy posting cost	κ	0.3070
Flow nonmarket value	z	0.9072
Matching elasticity	α	0.4711
Worker bargaining power	η	0.4711

Calibration: Model with OJS

Parameter	Value	Parameter	Value
β	0.997	m	0.5508
δ	0.004	κ	0.2955
ϕ	0.12	z	0.9279
χ_j	[0.56, 0.94]	α	0.3901
λ	0.0508	η	0.3901

Job sorting and pooling externality

- ▶ Our model with homogeneous firms eliminates the pooling mechanism and matches all described facts
- ▶ Richer models with firm heterogeneity have to ensure that this pooling mechanism is not too strong, e.g.,
 - ▶ Firm's location choice is made before learning its type
 - ▶ Strong local complementarities (mining firms have to locate near mines), proximity to customers
 - ▶ Strong agglomeration effects
 - ▶ Directed search by workers

Comparison to Bilal (2023)

- ▶ Bilal (2023) proposes a novel mechanism of spatial employer sorting on vacancy filling rates
- ▶ This mechanism predicts that high unemployment locations have low vacancy filling rates
- ▶ How does Bilal (2023) identify employer sorting?
 - ▶ Key identifying assumption in Bilal (2023) is that local productivity differences do not induce differences in separation rates
 - ▶ Achieved by assuming worker outside option scales up one-to-one with local productivity
 - ▶ Thus, separation rate differences are assumed to only reflect employer sorting
 - ▶ Given that separation rate is important in the data, the identifying assumption immediately implies that sorting has to be important
- ▶ Empirical patterns of vacancy filling rates we document help quantify the importance of sorting on vacancy filling rates
- ▶ We show spatial DMP with endogenous separations matches all local labor market facts