Mismatch Unemployment in the U.K.

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Bank of England, June 2013

Unemployment rate in the U.K.

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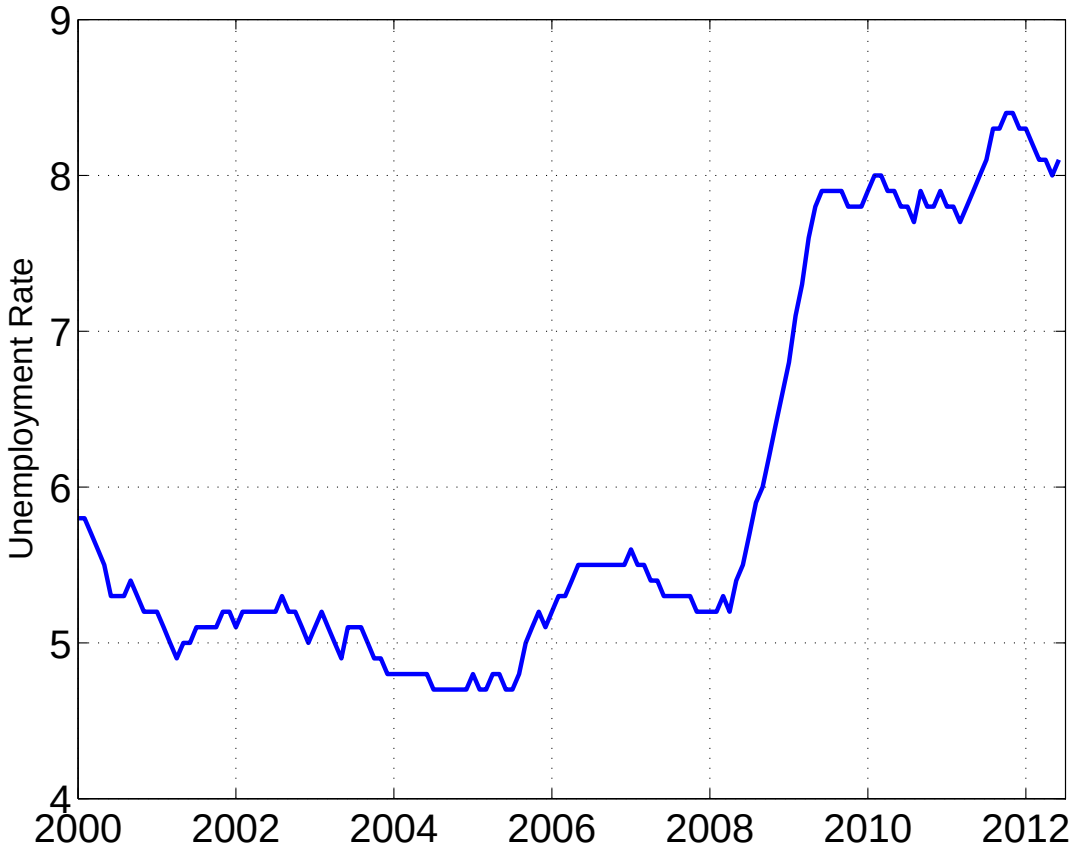

- increased to above 8% during the recession
- remained persistently high

The mismatch hypothesis

- Growing misalignment between distributions of job seekers and job openings across sectors (locations, industries, occupations)

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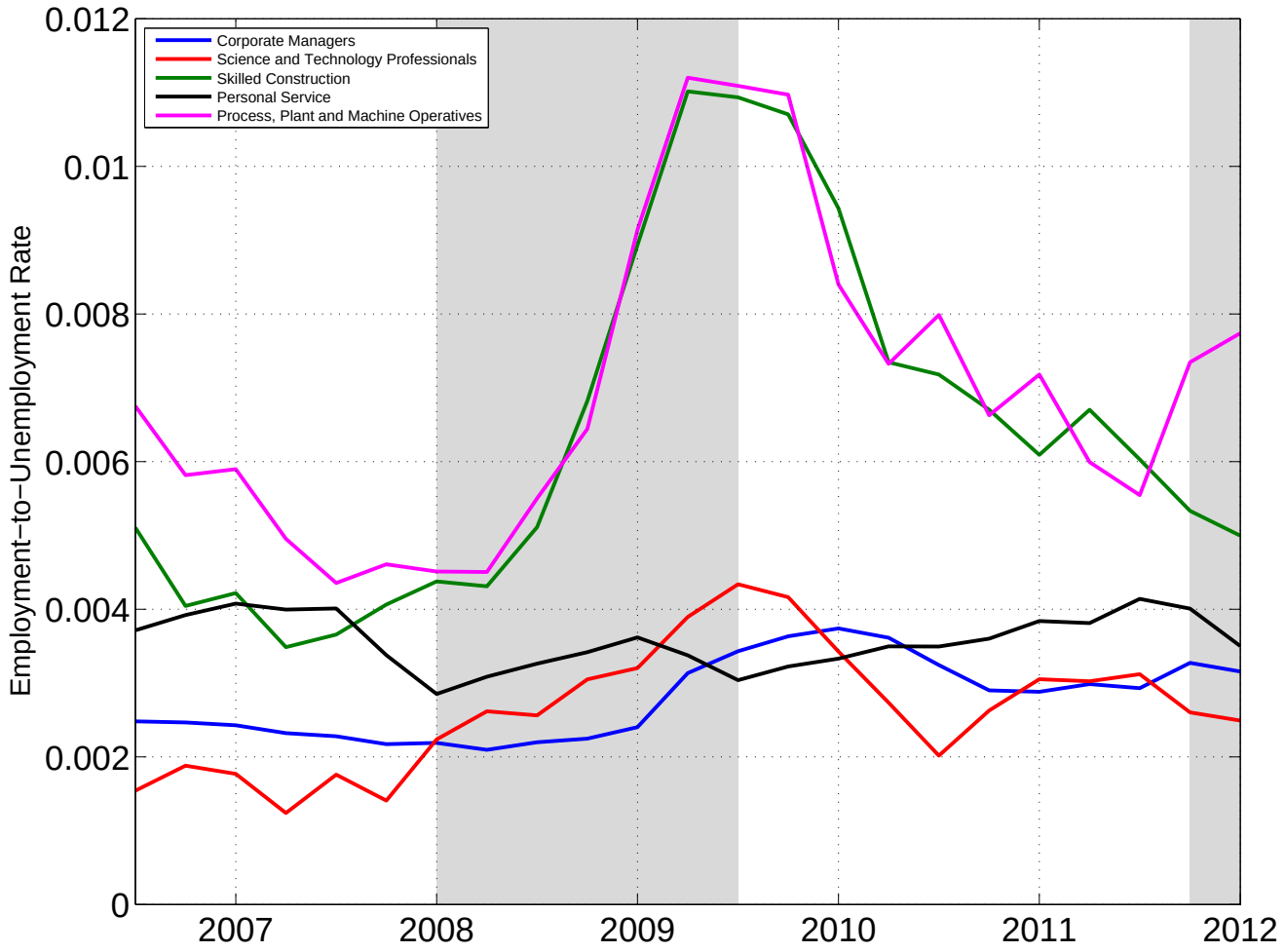
  - Job losses concentrated in certain sectors

Job destruction rates



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- Questions:
  - How much of the rise in unemployment is due to mismatch?
  - Along which dimensions has mismatch worsened?

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- $\{v_{it}\}$: observed allocation of vacancies
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- $\{u^*_{it}\}$: benchmark allocation under free mobility across markets
  (constrained first-best)
- Discrepancy between $\{u_{it}\}$ and $\{u^*_{it}\}$

  $\longrightarrow$ lower aggregate job-finding rate

  $\longrightarrow$ additional (mismatch) unemployment

Environment

- I distinct frictional labor markets
  - New production opportunities v_{it} arise exogenously

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- Measure one of infinitely-lived agents with linear utility
  - Agents can be employed (e) or unemployed (u)
  - Unemployed: search directed toward one market only
  - Employed: no OJS, exogenous separation shocks $\left(\Delta_t, \delta_{it}\right)$

Planner's allocation rule

1. Shocks $\{\phi_{it}, z_{it}, \delta_{it}\}$ are i.i.d. across sectors, orthogonal to each other, and follow positive martingales

2. No impediment to mobility of labor across markets

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The planner's allocation rule requires equalizing (across sectors):

$$\frac{z_{it}}{1-\beta\left(1-\Delta_t\right)\left(1-\delta_{it}\right)}\phi_{it}m_{u_{it}}\left(\frac{v_{it}}{u_{it}^*}\right)$$

productive and matching efficiency-weighted v/u ratios

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productive and matching efficiency-weighted v/u ratios

Assume: $m(u_{it}, v_{it}) = v_{it}^{\alpha} u_{it}^{1-\alpha}$

Mismatch Index (special case: no heterogeneity)

- Observed aggregate hires: $h_t = \Phi_t \sum_{i=1}^{I} v_{it}^{\alpha} u_{it}^{1-\alpha}$
- Planner's aggregate hires: $h_t^* = \Phi_t v_t^{\alpha} u_t^{1-\alpha}$

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- Mismatch index:

$$\mathcal{M}_t \equiv \frac{h_t^* - h_t}{h_t^*} = 1 - \sum_{i=1}^{I} \left(\frac{v_{it}}{v_t} \right)^{\alpha} \left(\frac{u_{it}}{u_t} \right)^{1-\alpha} \in [0, 1]$$

measures the fraction of hires lost because of misallocation

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- Mismatch shifts the aggregate matching function:

$$h_t = (1 - \mathcal{M}_t) \cdot h_t^* = (1 - \mathcal{M}_t) \cdot \Phi_t v_t^{\alpha} u_t^{1-\alpha}$$

Add heterogeneity in ϕ_{it}

$$\mathcal{M}^h_{\phi t} \equiv \frac{h^*_t - h_t}{h^*_t} = 1 - \sum_{i=1}^{I} \left(\frac{\phi_{it}}{\bar{\phi}_t} \right) \left(\frac{v_{it}}{v_t} \right)^{\alpha} \left(\frac{u_{it}}{u_t} \right)^{1-\alpha}$$

where

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- With heterogenous $(\phi_{it}, z_{it}, \delta_{it}) \rightarrow \mathcal{M}^h_{xt}$

Counterfactual unemployment

- Observed unemployment:

$$u_{t+1} = u_t + s_t \cdot (1 - u_t) - f_t \cdot u_t$$

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2. no mismatch: $f_t^* = \Phi_t \cdot \left(\frac{v_t}{u_t^*}\right)^{\alpha} = f_t \cdot \underbrace{\frac{1}{1 - \mathcal{M}_t}}_{\text{Direct Effect}} \cdot \underbrace{\left(\frac{u_t}{u_t^*}\right)^{\alpha}}_{\text{Feedback through u}}$

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- Counterfactual unemployment in absence of mismatch:

$$u_{t+1}^* = u_t^* + s_t \cdot (1 - u_t^*) - f_t^* \cdot u_t^*$$

- Mismatch unemployment: $u_t - u_t^*$

Data used: July 2006 - June 2012

- Unemployed $\{u_{it}\}$: Jobseeker's Allowance Claimant Counts
- Vacancies $\{v_{it}\}$: Jobcentre Plus Vacancy Statistics
  - Sought occupation
  - Geographic location (Travel To Work Area)

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  - Geographic location (Travel To Work Area)
- Productivity $\{z_{it}\}$: Annual Survey of Hours and Earnings (ASHE)
- EU rates $\{\delta_{it}\}$: Labor Force Survey (LFS)
- Matching function parameters $\alpha, \{\phi_{it}\}$: estimated

Summary statistics

Summary statistics

	No. Sectors	Vacancies	Claims
2-digit occupation	24	7712	23173
3-digit occupation	76	1510	6471
Travel To Work Areas	215	619	2288
TTWA x 2-digit	1059	118	314
Region	11	26920	113725

Unemployment: Claimant Count vs. LFS

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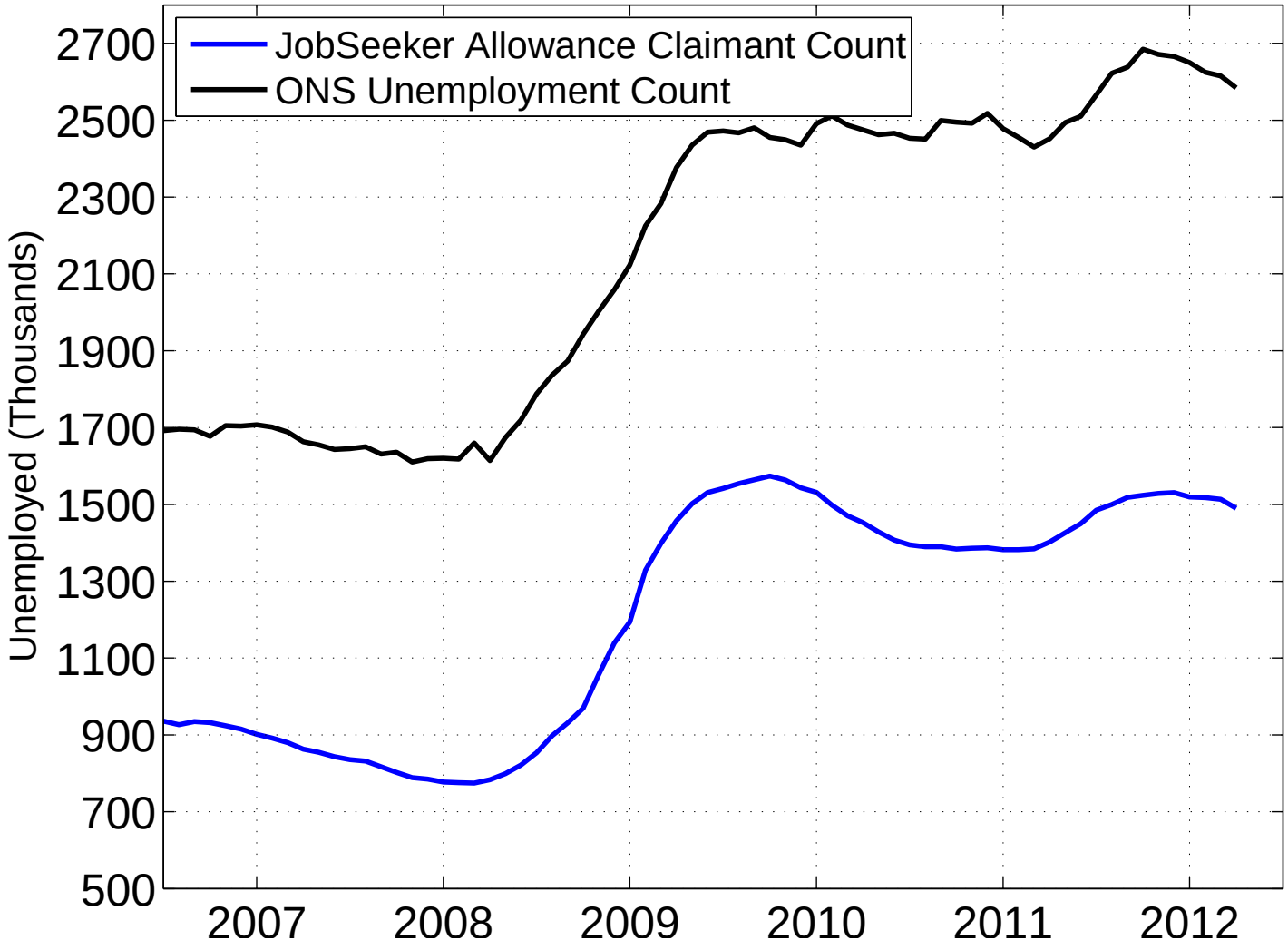

Correlation = 0.98

Vacancies: Jobcentre Plus vs. ONS vacancy survey

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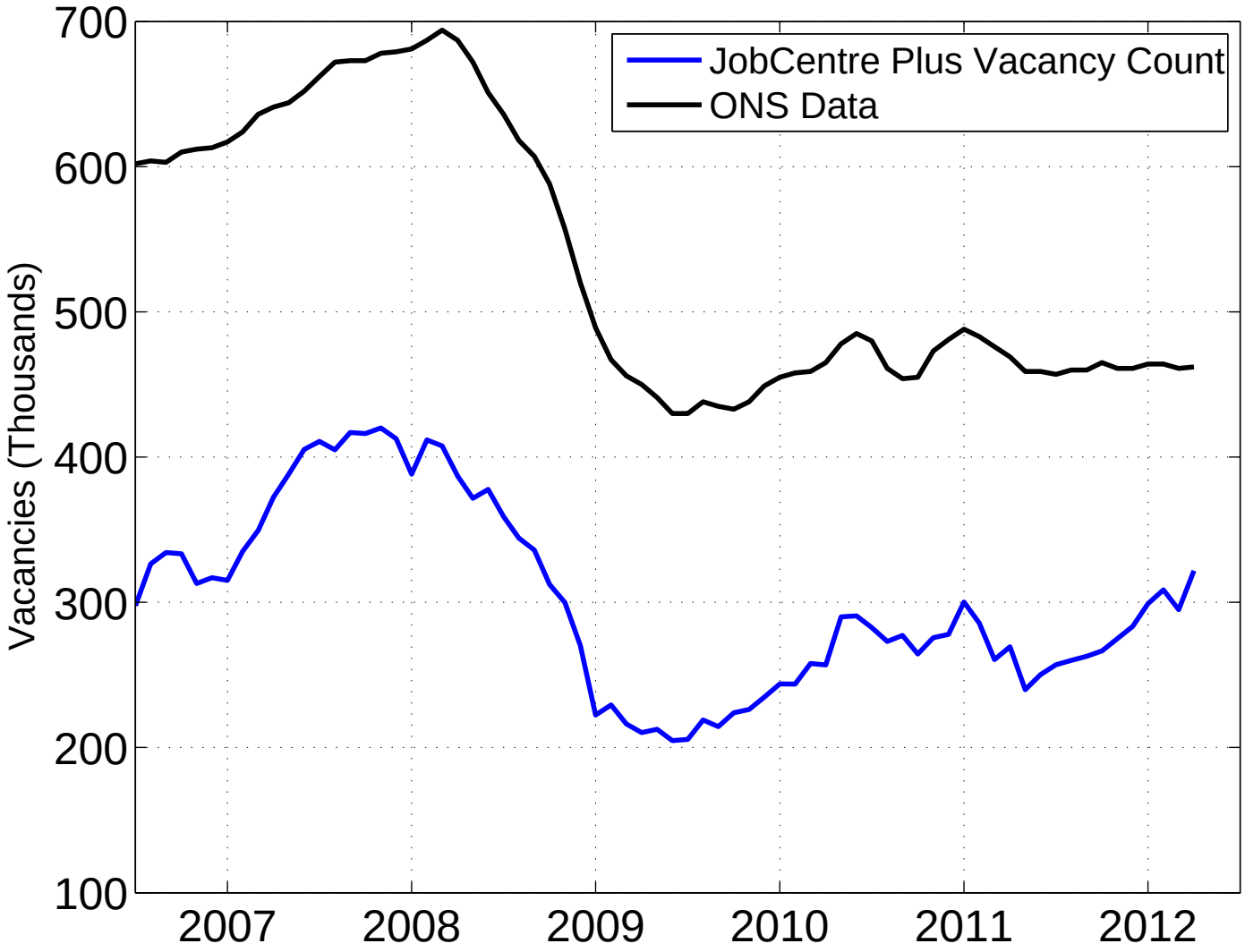


Correlation = 0.92

Comparisons

- Claimants: more prime-age males relative to LFS.
- Interesting pattern re unemployment duration:
  - fewer ST unemployed than in LFS, pre-recession;
  - duration distribution matches LFS, post-recession.

Claimant Count vs. LFS

	Labor Force Survey		Claimant Count	
	Pre-Recession	Post-Recession	Pre-Recession	Post-Recession
Age				
16-24	0.42	0.39	0.42	0.35
25-49	0.43	0.45	0.52	0.57
50+	0.14	0.15	0.07	0.08
Gender				
Male	0.57	0.59	0.73	0.71
Female	0.43	0.41	0.27	0.29
Duration				
under 6 months	0.60	0.52	0.47	0.54
6-12 months	0.16	0.19	0.21	0.21
12-24 months	0.13	0.16	0.16	0.14
24+ months	0.11	0.13	0.17	0.12

Comparisons

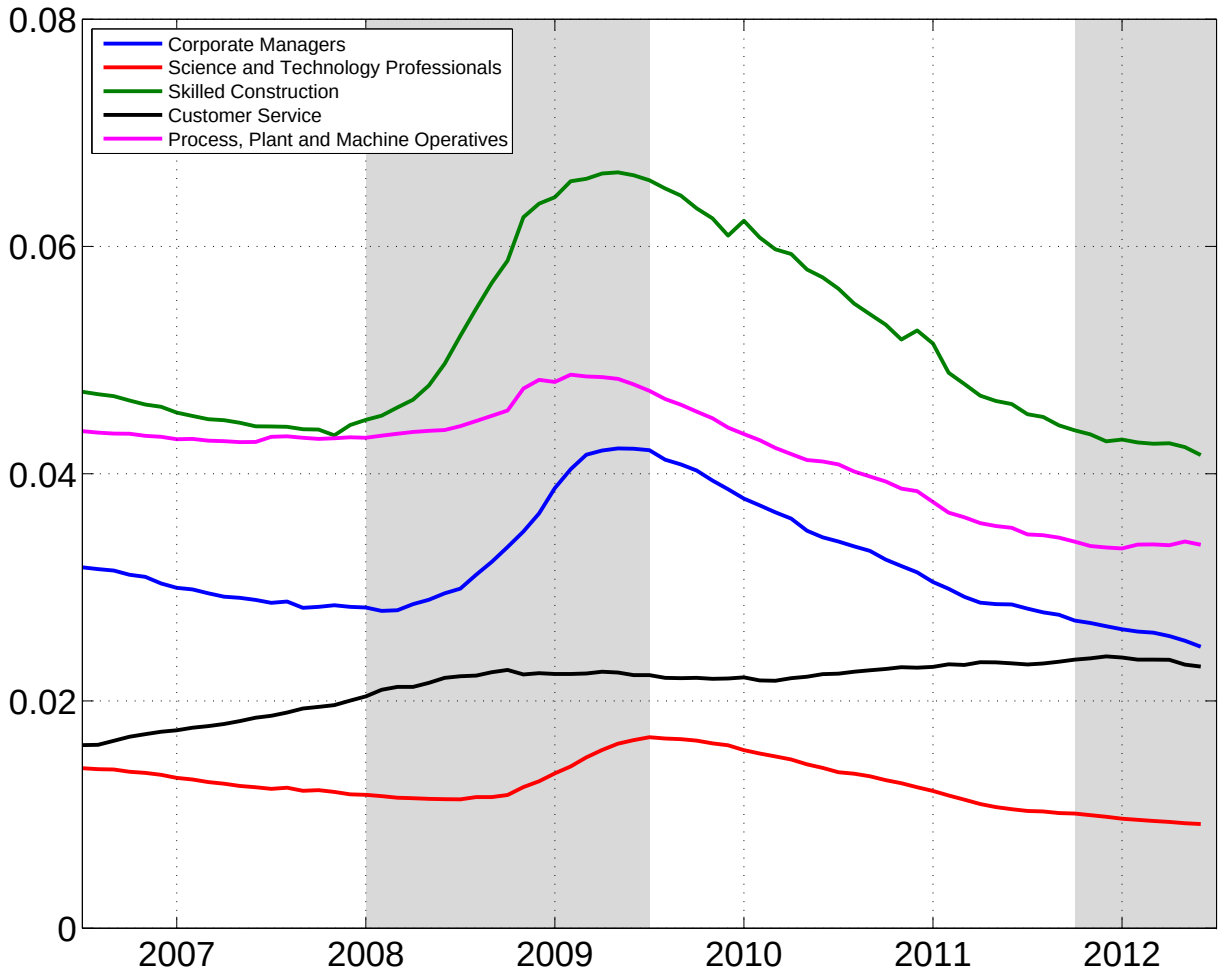
- Claimants: more prime-age males relative to LFS.
- Interesting pattern re unemployment duration:
  - fewer ST unemployed than in LFS, pre-recession;
  - duration distribution matches LFS, post-recession.
- Jobcentre Plus vacancies: more concentrated in banking, finance and insurance.
- Under-represent manufacturing; distribution, hotels and restaurants; transport and communications.

Jobcentre Plus vacancies vs. ONS

	Vacancy Survey		JobCentre Plus	
	Pre-Rec	Post-Rec	Pre-Rec	Post-Rec
Industry				
Energy and Water	0.01	0.01	0.01	0.01
Manufacturing	0.09	0.07	0.03	0.03
Construction	0.04	0.03	0.03	0.03
Distribution, Hotels & Restaurants	0.28	0.28	0.17	0.13
Transport and Communications	0.11	0.10	0.04	0.03
Banking, Finance & Insurance	0.23	0.21	0.57	0.53
Public Admin., Education & Health	0.21	0.24	0.12	0.20
Other Services	0.04	0.04	0.04	0.05

Change in unemployment shares across occupations

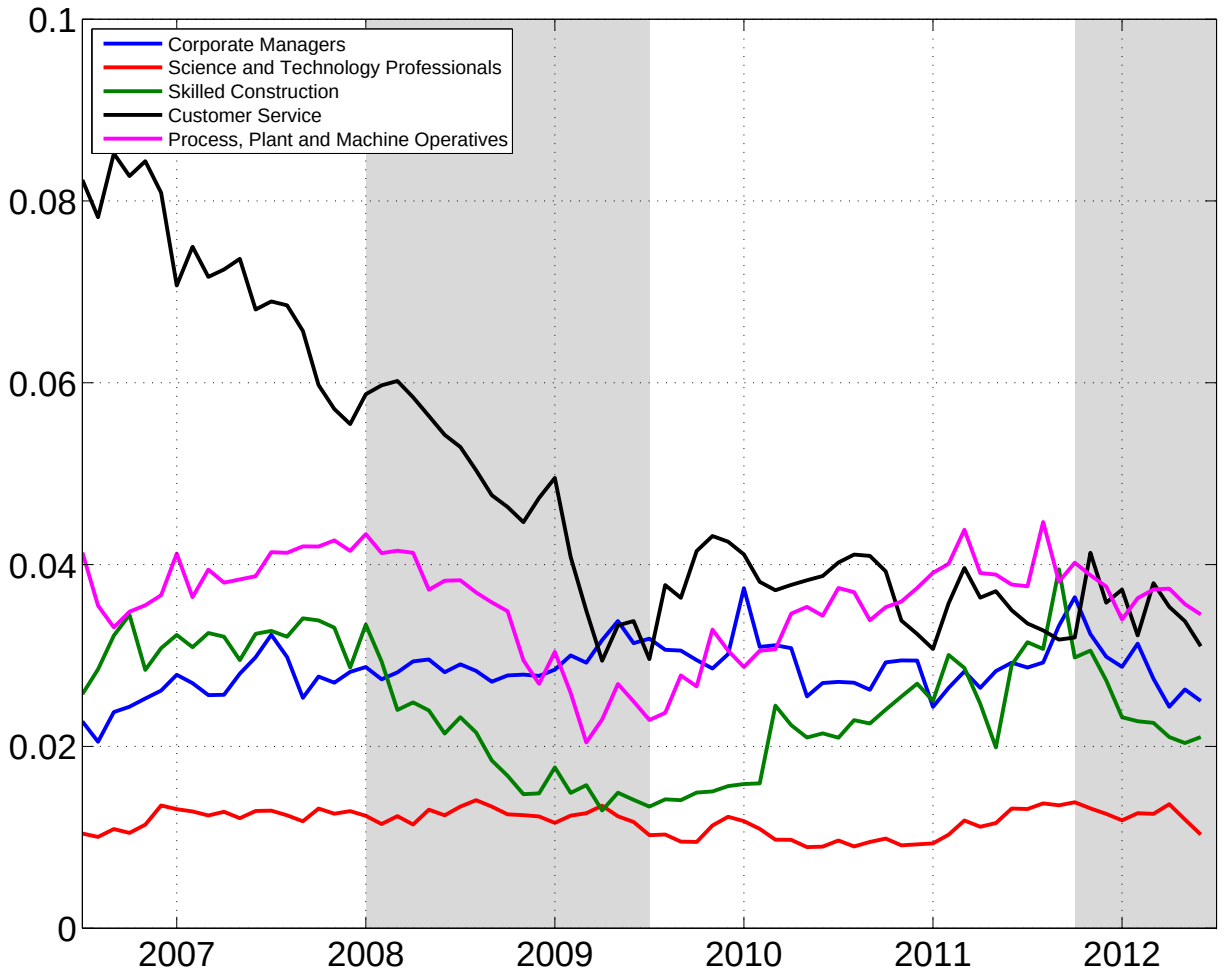
Change in unemployment shares across occupations



Skilled Construction, Corporate Managers particularly hit

Change in vacancy shares across occupations

Change in vacancy shares across occupations



Sharp decline in Construction, Customer Service, Manufacturing

Correlation between (u, v) shares across occupations

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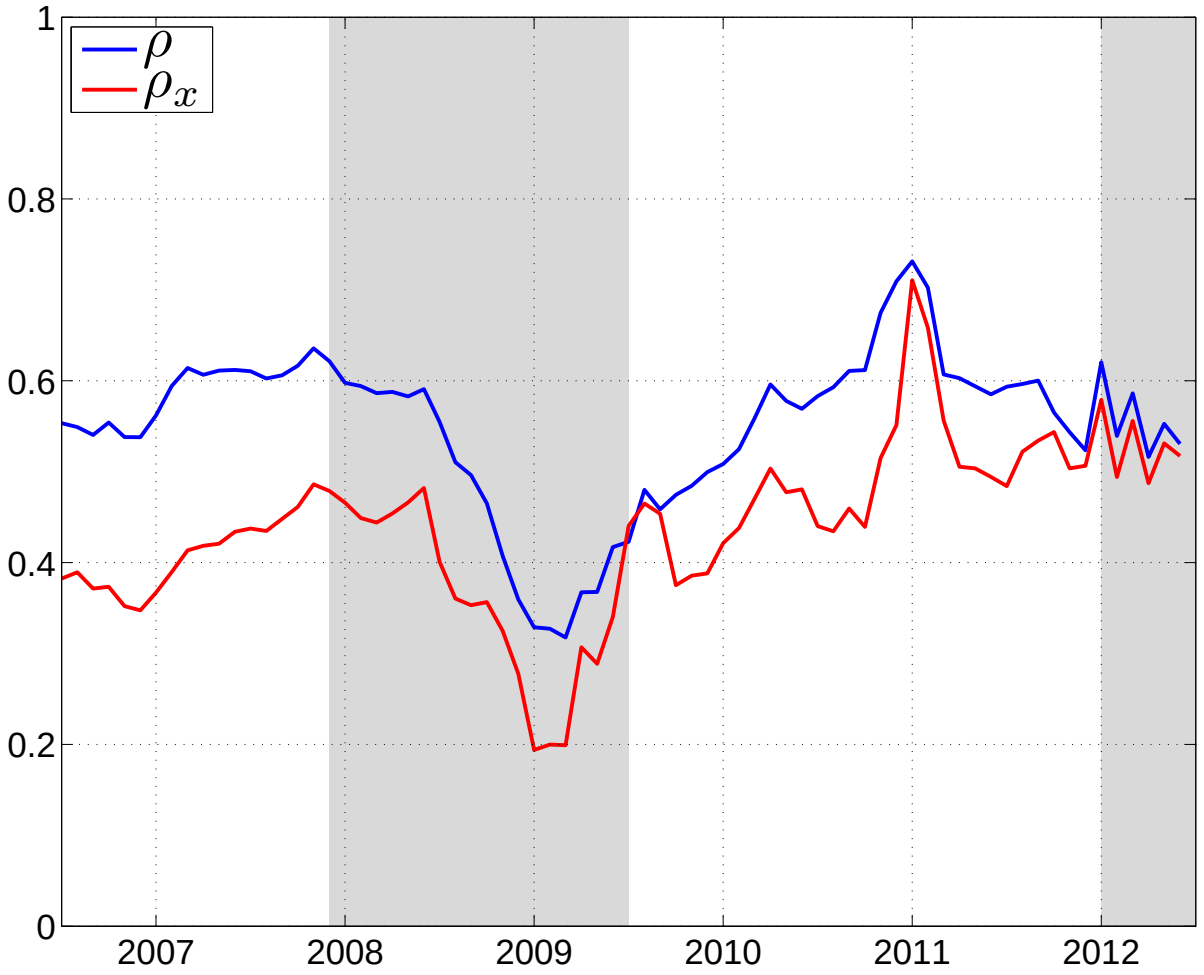

A decline in the correlation is a sign of worsening mismatch

Unemployment outflow data

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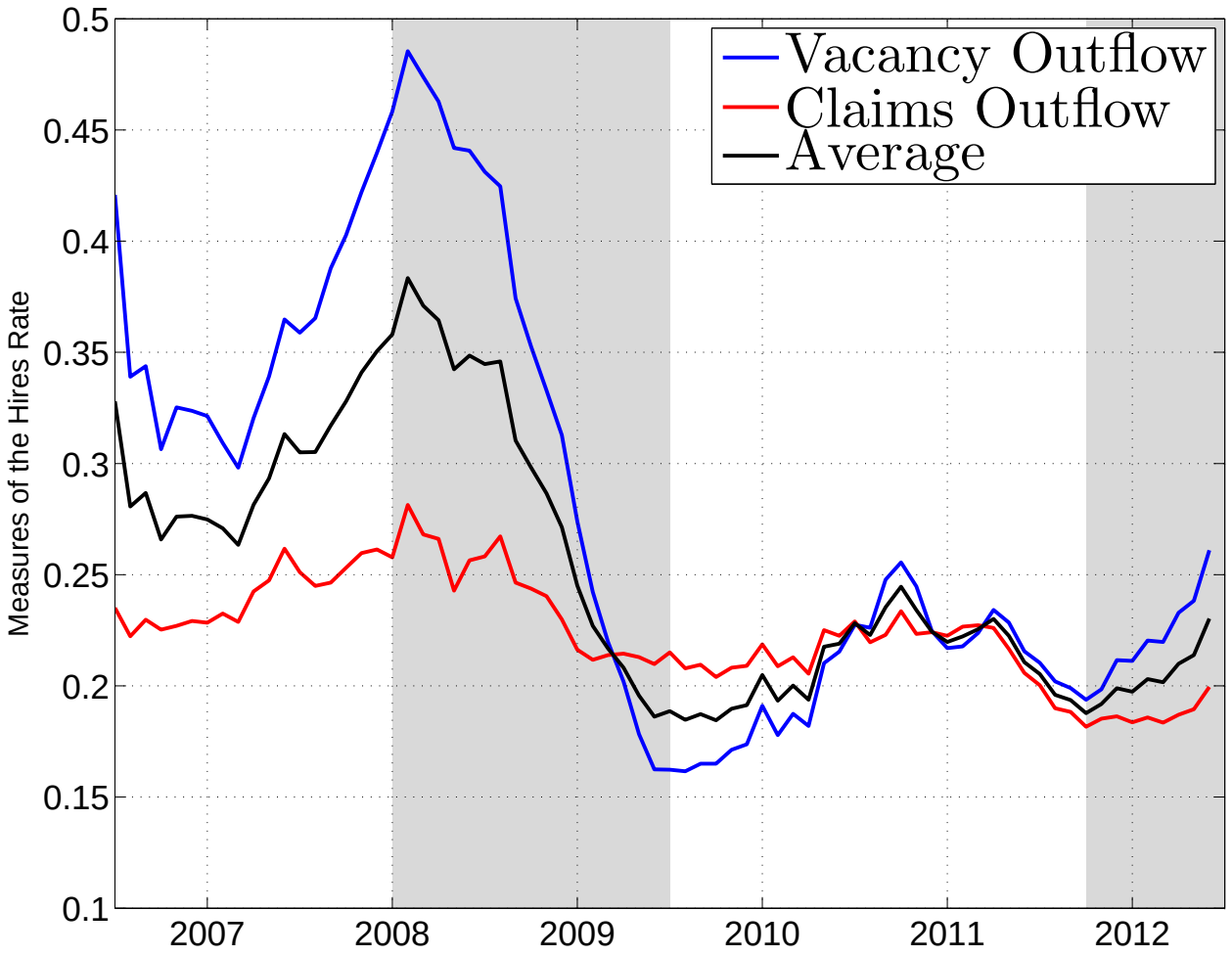

We use the average of the two series to estimate α and $\{\phi_i\}$

Matching function estimation

- At the aggregate level:

$$\ln\left(\frac{h_{it}}{u_{it}}\right) = const + \gamma' QTT_t + \alpha \ln\left(\frac{v_{it}}{u_t}\right) + \epsilon_t$$

Matching function estimation

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$$\ln\left(\frac{h_{it}}{u_{it}}\right) = const + \gamma' QTT_t + \alpha \ln\left(\frac{v_{it}}{u_t}\right) + \epsilon_t$$

- At the sectoral level:

$$\ln\left(\frac{h_{it}}{u_{it}}\right) = \gamma' QTT_t + \chi_{t\leq 8.03} \ln \phi_i^{pre} + \chi_{t>8.03} \ln \phi_i^{post} + \alpha \ln\left(\frac{v_{it}}{u_{it}}\right) + \epsilon_t$$

Estimation results

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	α	Sample Size
Aggregate	0.559^{***} (0.059)	72
ϕ_i Fixed	0.472^{***} (0.006)	1728
ϕ_i Varying	0.463^{***} (0.006)	1728

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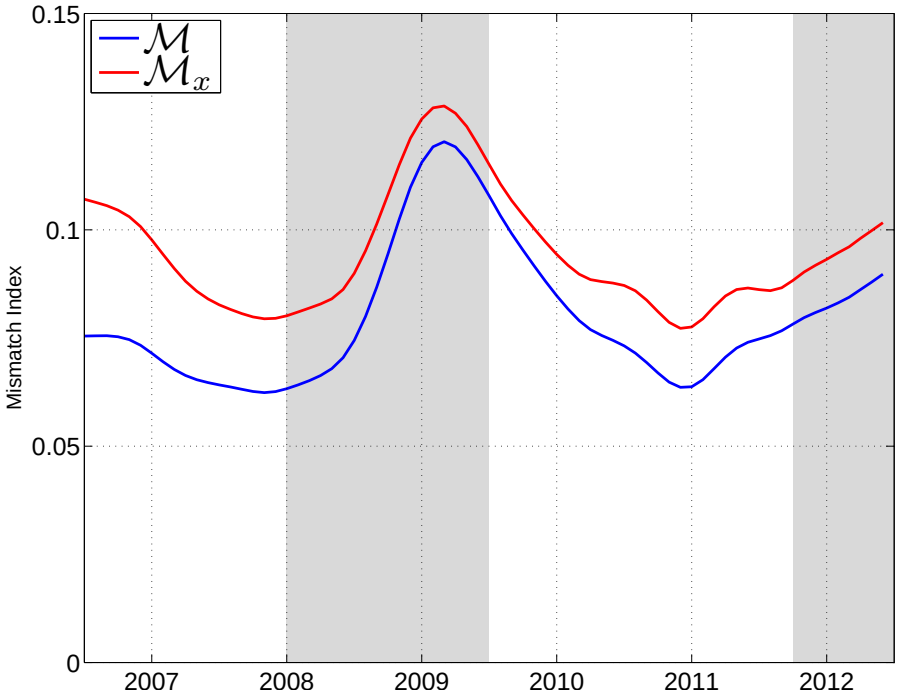
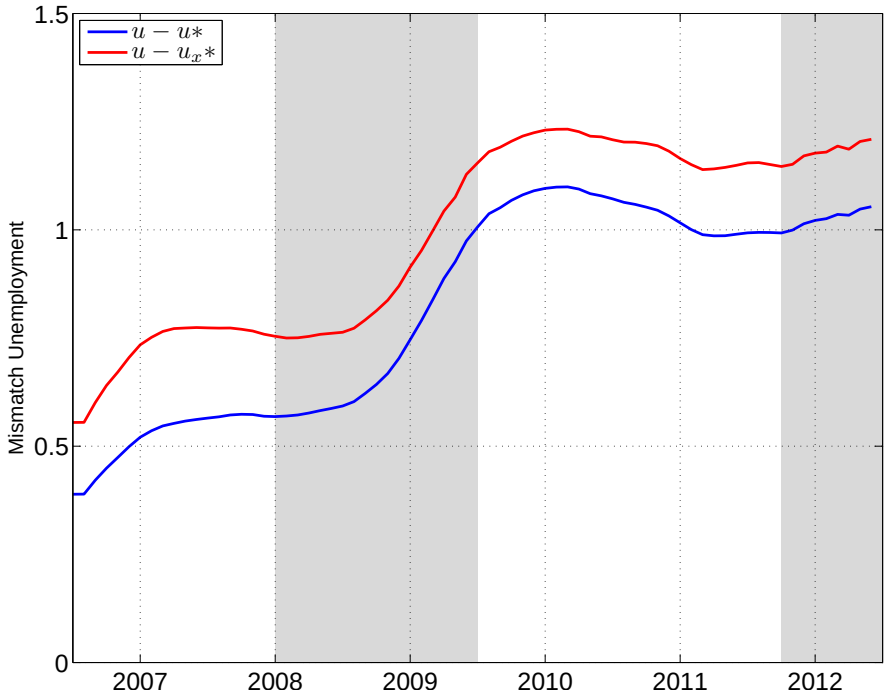
Distribution of estimated ϕ_i varies between 0.43 and 0.67.

Occupational mismatch (2-digit)

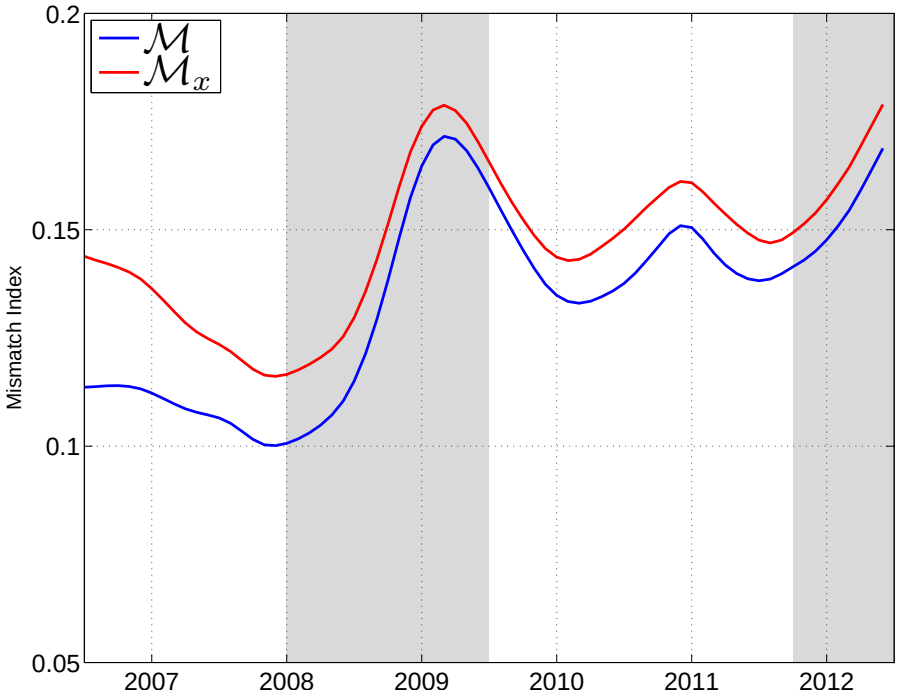


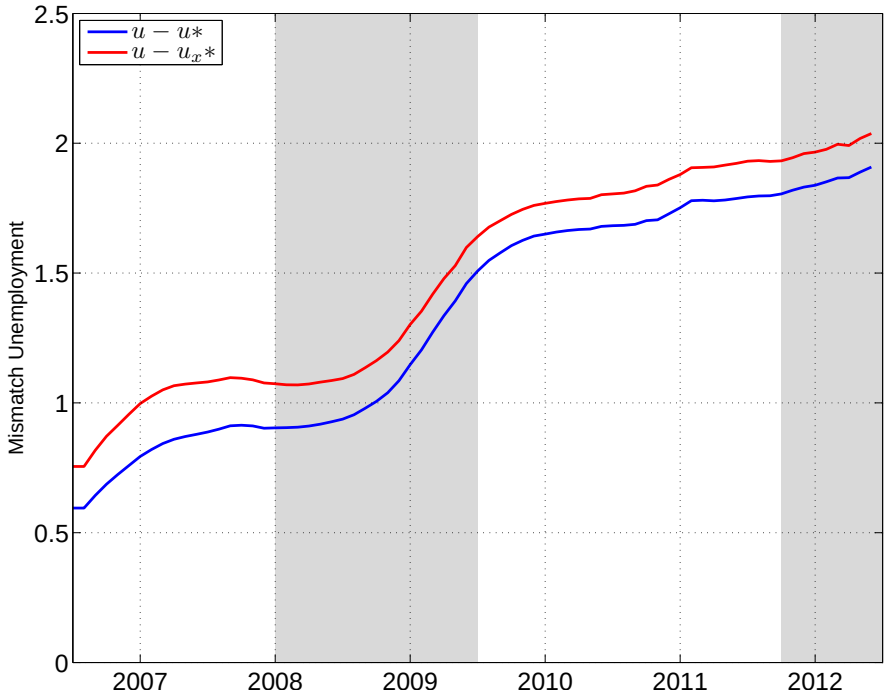


About 6 pct of hires lost in the recession bc of higher mismatch

About 0.5 pct points increase in mismatch unemployment

Occupational mismatch (3-digit)

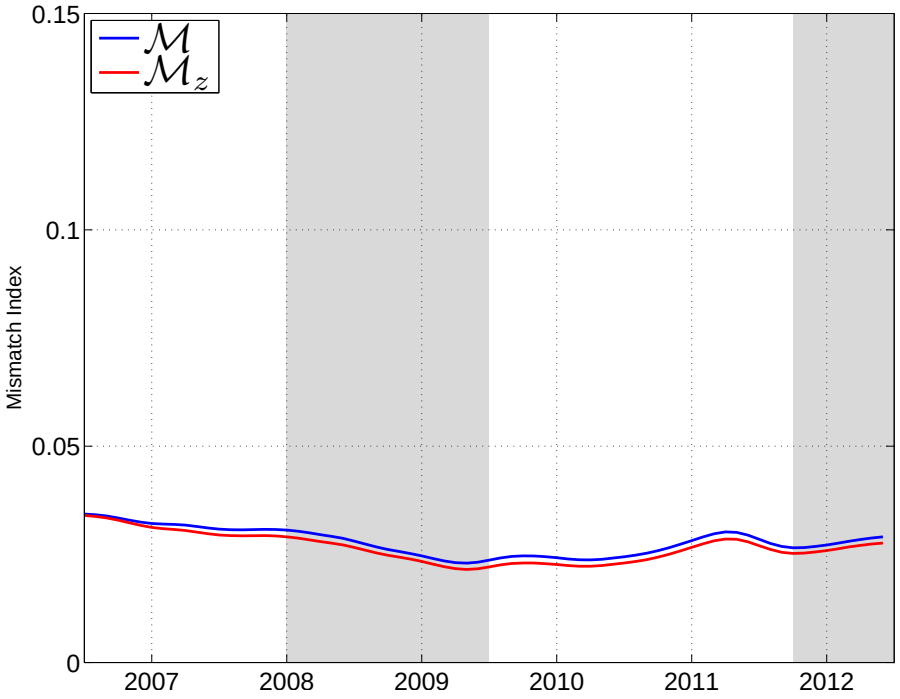


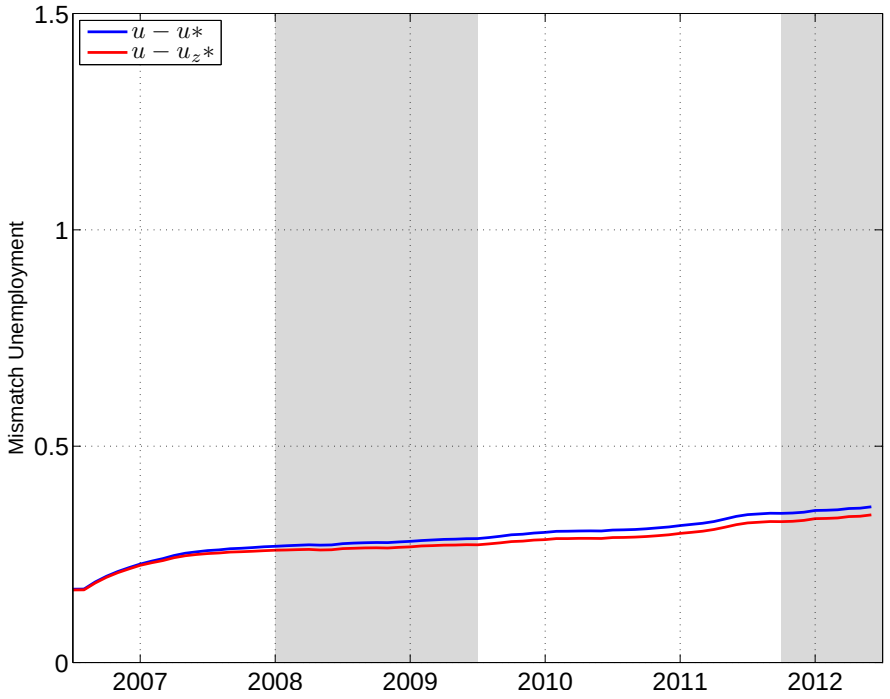


About 7 pct of hires lost in the recession bc of higher mismatch

About 0.75 pct points increase in mismatch unemployment

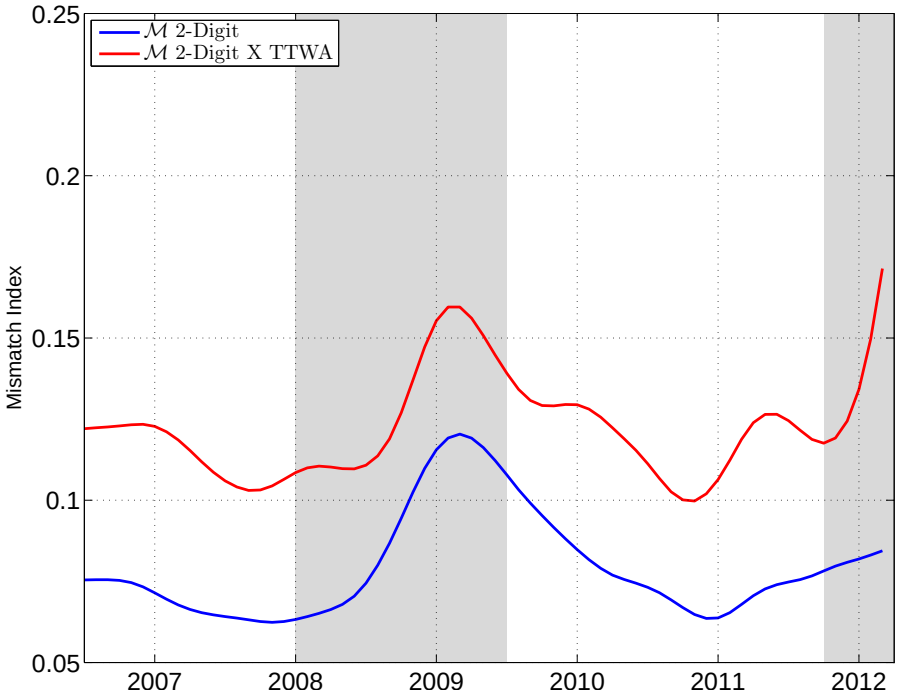
Geographic mismatch (TTWA's)

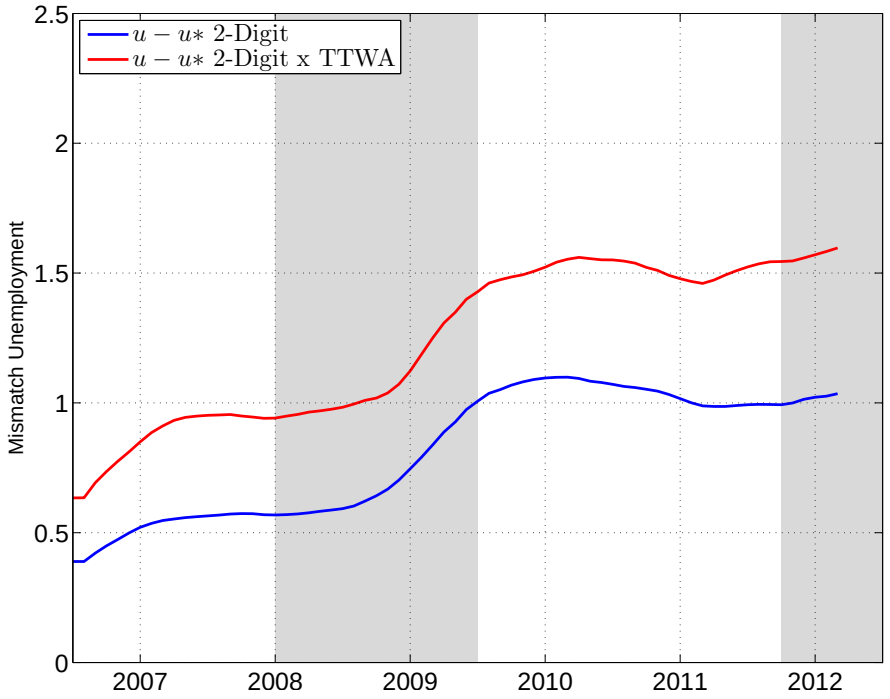




Negligible increase in mismatch unemployment

Occupation X geography mismatch (2-digit x TTWA)





About 6 pct of hires lost in the recession bc of higher mismatch

About 0.6 pct points increase in mismatch unemployment

Routine-Cognitive Occupations

- Notion of job polarization:
  - more jobs in highest/lowest skill (non-routine) occupations;
  - fewer opportunities in middle skill (routine) occupations.

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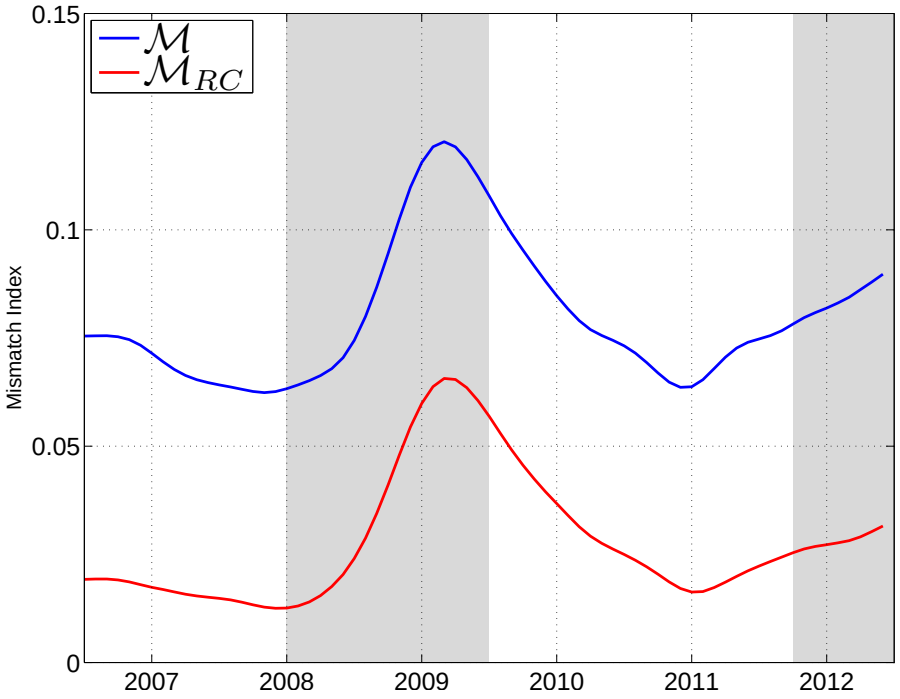
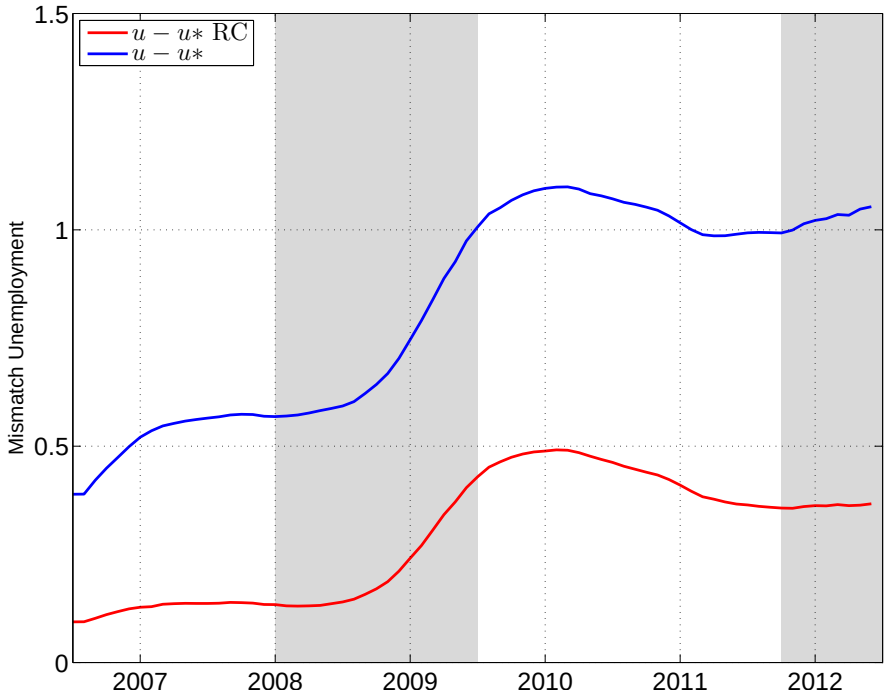
- Notion of job polarization:
  - more jobs in highest/lowest skill (non-routine) occupations;
  - fewer opportunities in middle skill (routine) occupations.
- Some examples:
  - (C, NR): Managers; professionals; culture, media, sports;
  - (C, R): Office and administrative support occupations;
  - (M, R): Skilled trades (metal, construction, printing, ...);
  - (M, NR): Sales and customer service occupations.

Routine-Cognitive Occupations





About 6 pct of hires lost in the recession bc of higher mismatch

About 0.4 pct points increase in mismatch unemployment

Summary of results

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	$\Delta(u-u^*)$	$\Delta(u-u^*)/\Delta u$
2-digit occupation	0.53 ppts	18.9%
3-digit occupation	0.75 ppts	26.9%
Travel To Work Areas	0.03 ppts	1.2%
TTWA x 2-digit	0.59 ppts	21.2%
Region	0.07 ppts	2.6%
Routine-Cognitive	0.36 ppts	12.8%

Contribution of mismatch unemployment highest for 3-digit occupations and occupations X geography

Endogenous vacancy creation

- Equilibrium:

  1. Free entry

     ► vacancy creation cost: $K_i(v_{it}) = \kappa_{it}^{\varepsilon} \cdot \frac{v_{it}^{1+\varepsilon}}{1+\varepsilon}$

  2. Hosios condition

  3. Bargaining solution: Shaked-Sutton (1984), Acemoglu (1996)

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$$(\kappa_{it} v_{it})^{\varepsilon} = \Phi_t \phi_{it} \left(\frac{u_{it}}{v_{it}} \right)^{1-\alpha} \alpha \frac{Z_t z_{it}}{1 - \beta (1 - \Delta_t)(1 - \delta_{it})}$$

- Given ε, back out $\{\kappa_{it}\}$ which replicates data on $\{v_{it}\}$

Endogenous vacancy creation

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- Planner's optimal vacancy creation:

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- Comparison: $\frac{v_{it}}{v_{it}^*} = \left(\frac{u_{it}}{u_{it}^*} \right)^{\frac{1-\alpha}{1-\alpha+\epsilon}}$

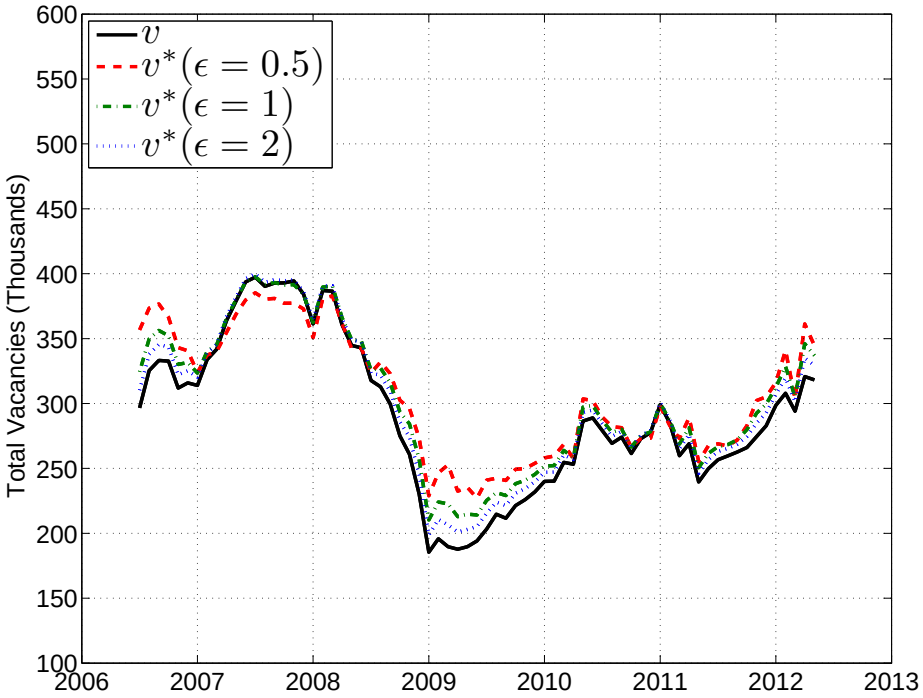
Endogenous vacancy creation

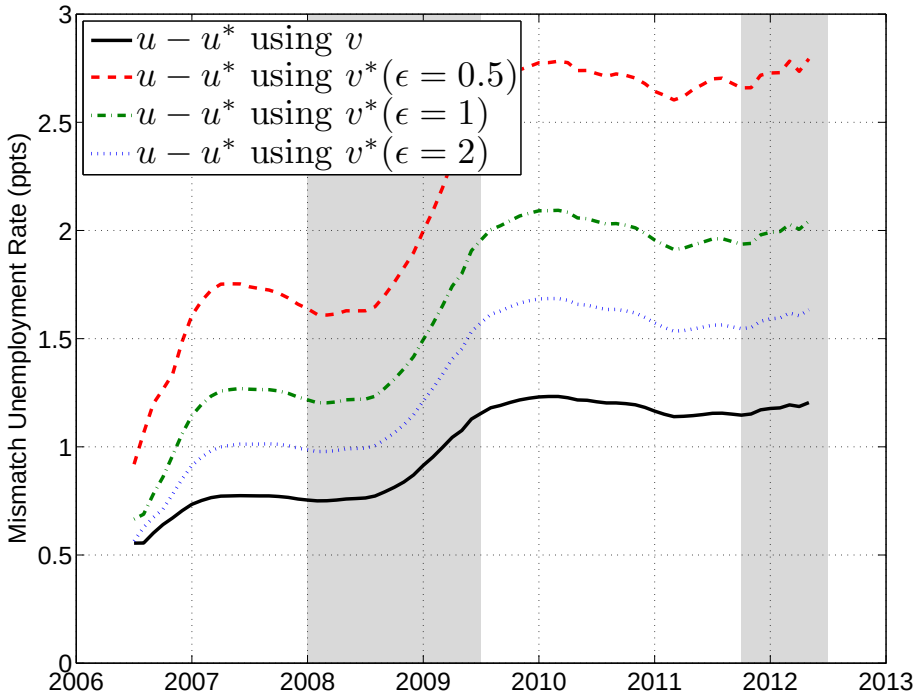
- Planner vs. observed job finding rate

$$f_t^* = f_t \cdot \underbrace{\frac{1}{1-\mathcal{M}_t}}_{\text{Direct Effect}} \cdot \underbrace{\left(\frac{u_t}{u_t^*}\right)^{\alpha}}_{\text{Feedback through u}} \cdot \underbrace{\left(\frac{v_t^*}{v_t}\right)^{\alpha}}_{\text{Feedback through v}}$$

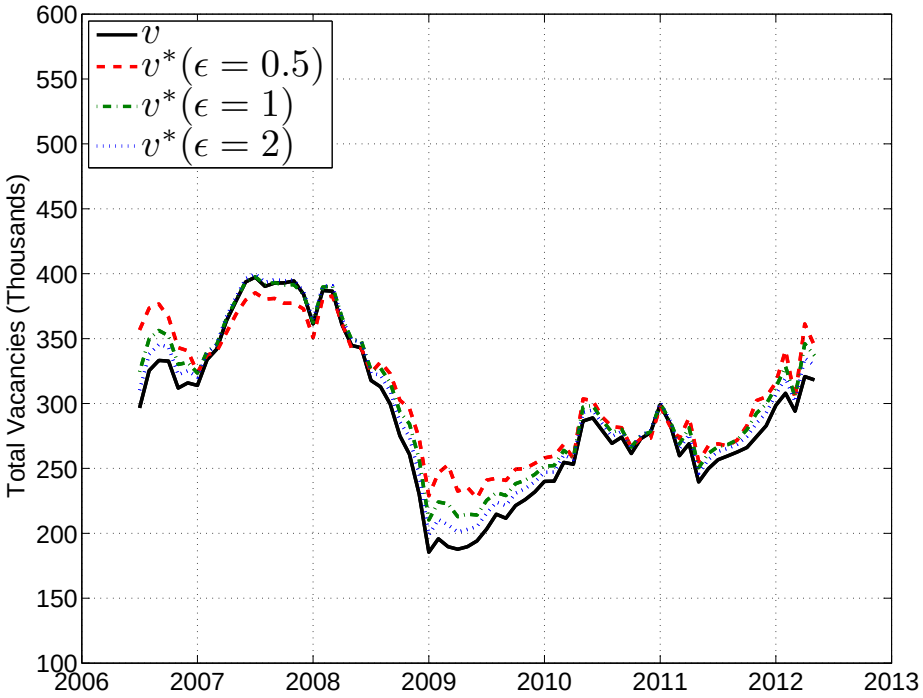
More misallocation $\rightarrow$ fewer vacancies $\rightarrow$ more mismatch unempl.

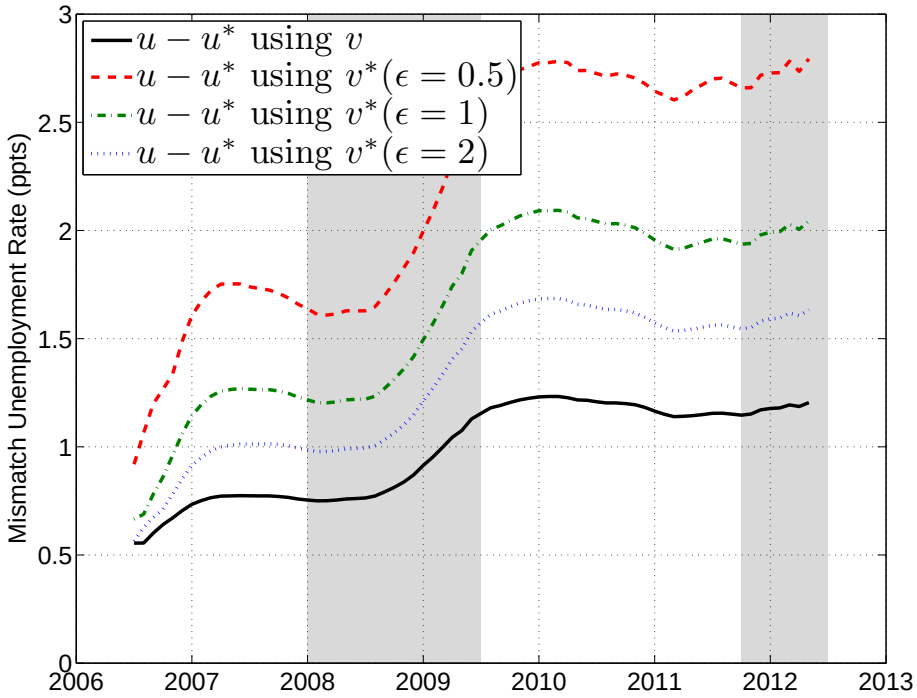
Mismatch u with endogenous vacancies





Mismatch u with endogenous vacancies





- Quantitatively, the value of ε is critical
- With $\varepsilon = 0.5$, increase in mismatch u is twice as large as baseline

Endogenous vacancies: sensitivity

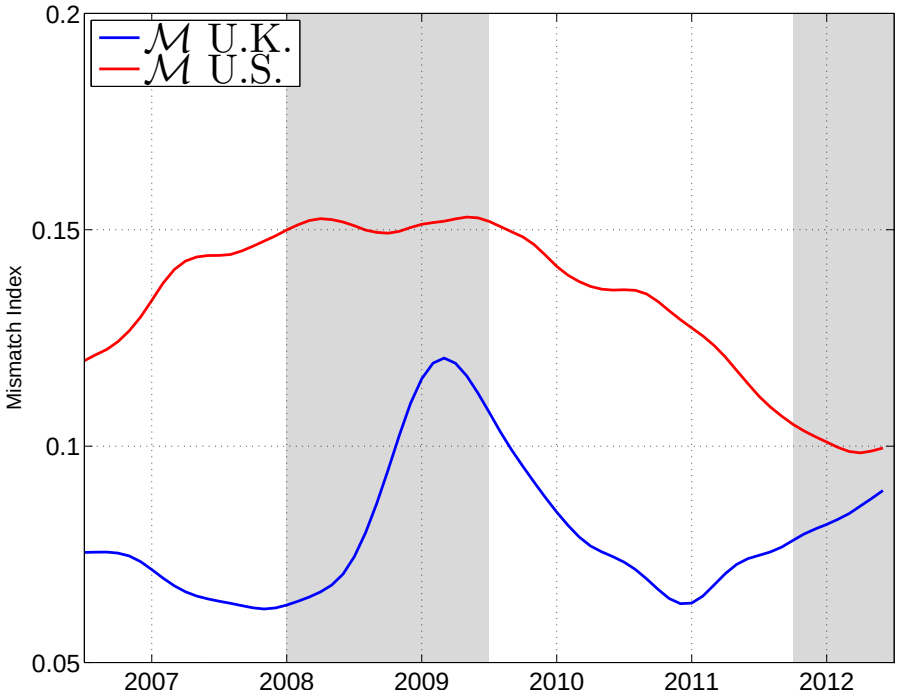
Endogenous vacancies: sensitivity

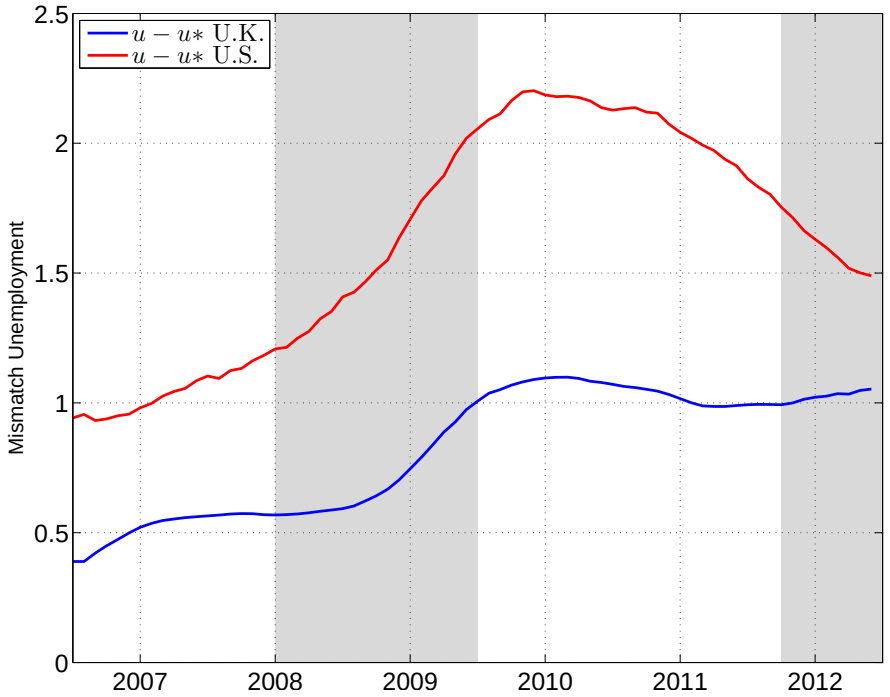
2-digit occupation	$\Delta(u - u^*)$	$\Delta(u - u^*)/\Delta u$
Baseline	0.53 ppts	18.9%
$\epsilon = 0.5$	1.16 ppts	41.2%
$\epsilon = 1$	0.88 ppts	31.5%
$\epsilon = 2$	0.70 ppts	25.1%

Conclusion and future work

- Contribution of mismatch to unemployment in the U.K.
  - Mismatch explains about 1/3 of rise in unemployment
  - Unlike the U.S., mismatch is on the rise again

Comparison to the U.S.





- More gradual increase and decline of mismatch in the U.S.
- Mismatch has been increasing again in the U.K. since 2011

Conclusion and future work

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  - Mismatch explains about 1/3 of rise in unemployment
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- Direct measurement of skill mismatch:
  - Distance in terms of skill content between $\{v_{it}\}$ and $\{u_{it}\}$

Conclusion and future work

- Contribution of mismatch to unemployment in the U.K.
  - Mismatch explains about 1/3 of rise in unemployment
  - Unlike the U.S., mismatch is on the rise again
- Direct measurement of skill mismatch:
  - Distance in terms of skill content between $\{v_{it}\}$ and $\{u_{it}\}$
- Structural equilibrium models
  - Sources of mismatch? Skill specificity, wage rigidity, policy, ...