Monetary Policy and Resource Mobility

200th Anniversary of the Bank of Finland

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May 5-6, 2011

Resource mobility

- Understanding costly resource mobility is important:
  - In U.S. – for understanding whether recent high unemployment is structural in nature because of the inability of labor resources to shift quickly between uses.
  - In EU – for understanding how the flow of resources among member countries affects EU-wide developments and inflation
- DSGE policy models:
  - Costly to adjust prices but labor and capital can move between firms without cost.
  - Prominent examples: Smets and Wouter (2003, 2007), Christiano, Eichenbaum and Evans (2005).
  - Models of currency union: Benigno (2004), Galí and Monacelli (2008)
    - ★ Perfectly integrated financial markets, perfect mobility of labor within members but absolute immobility across member states.

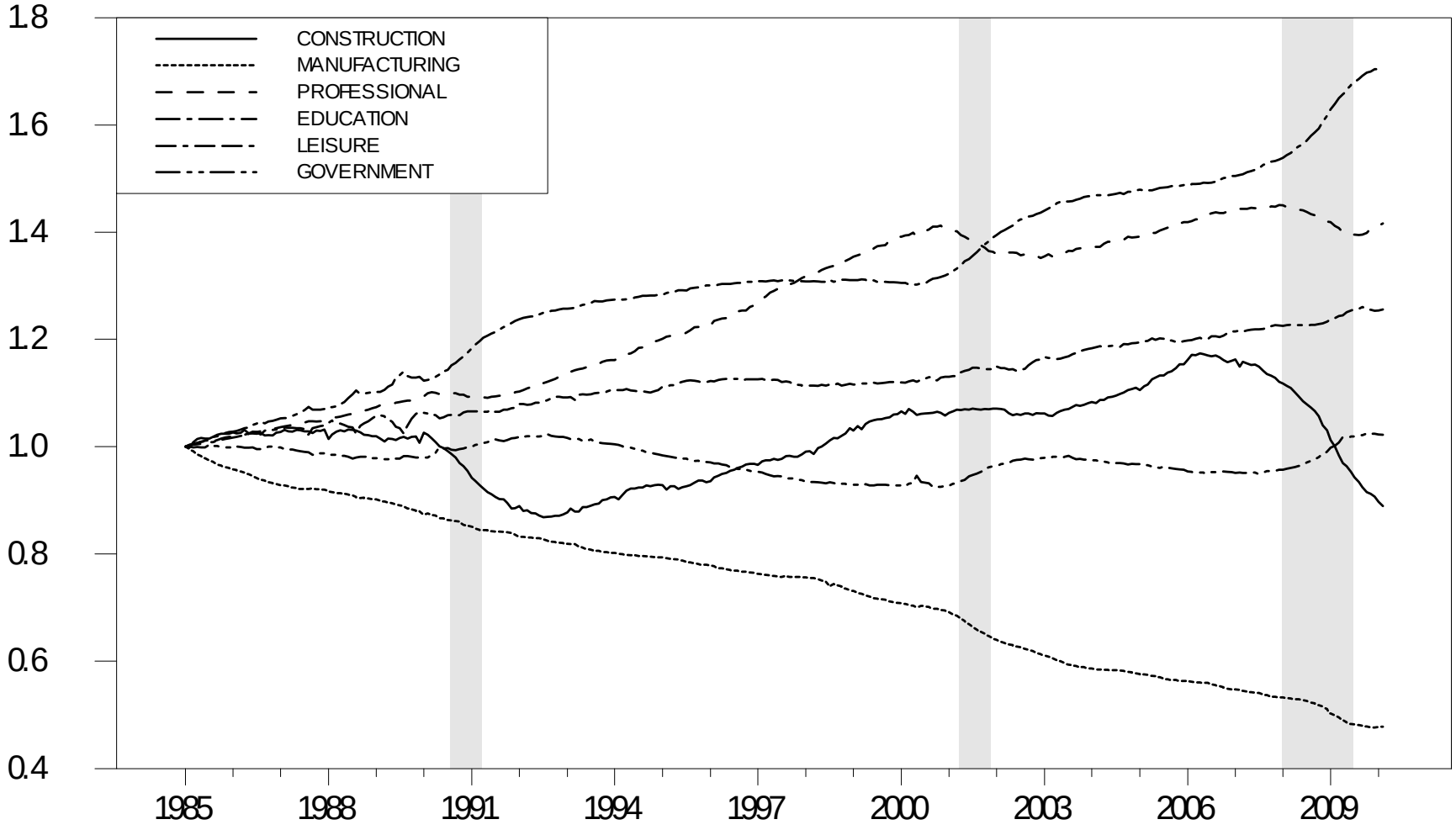

Figure: Employment shares in construction, manufacturing, professional and business services, educational and health services, leisure and hospitality services, and government (1985:1 = 1). These sectors account for just under 70% of U.S. total employment. Shaded regions denote NBER business cycle recessions.

Key questions

1. How important is resource mobility for the transmission mechanism of monetary policy?
2. How important is resource mobility for the objectives of monetary policy?

- Resource mobility will matter for both what monetary policy can do and should do.
- Focus will be on labor mobility to illustrate this conclusion.

Outline of talk

- Evidence on sectoral reallocation and unemployment:
  - Revisit Lilien (1982), Abraham and Katz (1986);
  - JOLTS data on vacancies.
- Role of costly labor adjustment in four illustrative models:
  - Quadratic costs;
  - Search model with one sector;
  - Search with skill heterogeneity;
  - Search model with two sectors.
- Implications for policy.

Shifting Beveridge curve

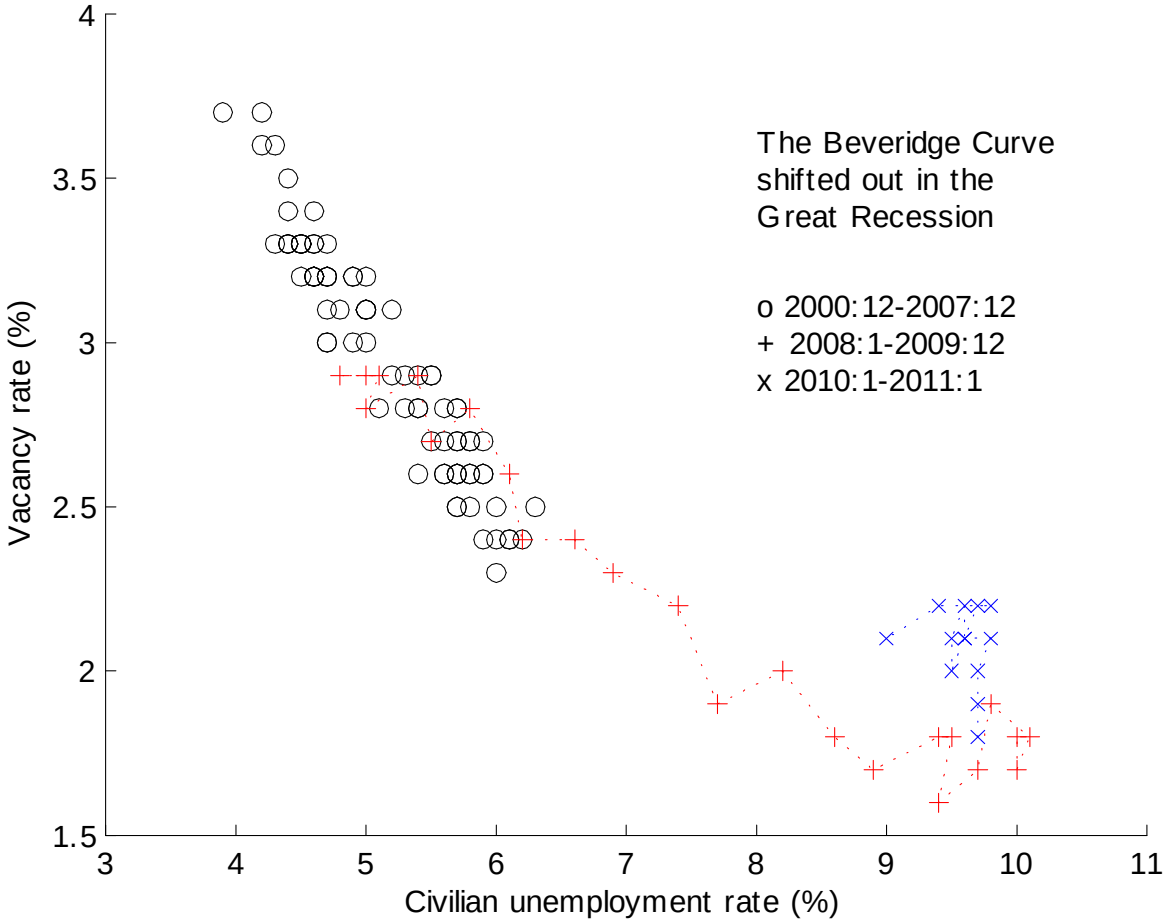

Figure: The U. S. Beveridge Curve

Sectoral dispersion and unemployment

- Does increased sectoral dispersion lead to a raise in average unemployment?
- If it does, does this mean some of the rise in U.S. unemployment represents a rise in structural unemployment – i.e., a rise in the natural rate?
- Or, does a cyclical rise in unemployment lead to an increase in sectoral dispersion?

Sectoral dispersion and unemployment

- Sectoral dispersion and unemployment was a topic of debate in the 1980s.
  - Lilien (1982)
  - Abraham and Katz (1986)
- Lilien's index of dispersion:

$$\sigma_t = \left[\sum_{i=1}^{K} \left(\frac{e_{i,t}}{e_t} \right) \left(\Delta \log e_{i,t} - \Delta \log e_t \right)^2 \right]^{1/2} .$$

Sectoral dispersion, unemployment, and vacancies (U.S.)

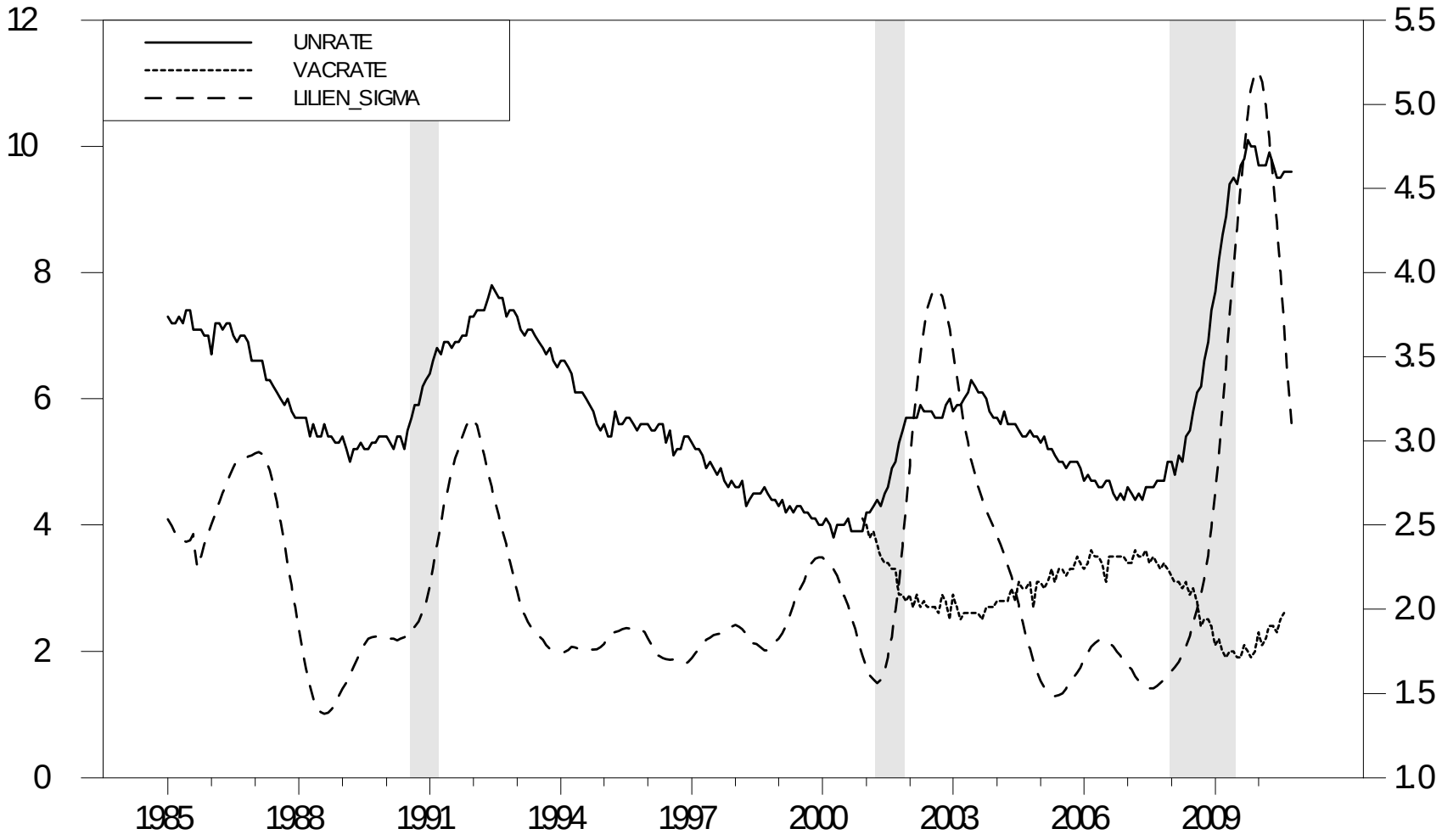

Figure: The civilian unemployment rate, the vacancy rate, and sectorial dispersion (right scale); monthly, U.S. data, 1985:1-2010:1. The dispersion measure is a 12-month moving average.

Sectoral dispersion, unemployment, and vacancies

Abraham and Katz (1986) regressions

Table 1A

U.S.: Monthly 2000:12-2010:09

	$z_t = \bar{c} + a_0\sigma_t + a_1\sigma_{t-1} + b_1 z_{t-1} + \sum_{i=1}^{4} c_i ip_{t-i}$	
	Unemployment rate	Vacancy rate
a_0	0.31^{**}	-0.16
a_1	-0.29^{**}	0.09
b_1	1.01^{**}	0.82^{**}
$\sum_{i=1}^{4} c_i$	0.01	-0.00

** Significant at the 5% level; * Significant at the 10% level.

Sectoral dispersion, unemployment and vacancies

Abraham and Katz (1986) regressions

Table 1B

U.S.: Monthly 2000:12-2010:09

	$\Delta z_t = \bar{c} + a_0 \Delta\sigma_t + \sum_{i=1}^{4} c_i \Delta ip_{t-i}$	
	Unemployment rate	Vacancy rate
a_0	0.24^{**}	-0.04
a_1		
b_1		
$\sum_{i=1}^{4} c_i$	-0.17^{**}	0.06^{*}

** Significant at the 5% level; * Significant at the 10% level.

Sectoral dispersion

- Using JOLTS data, sectoral dispersion is associated with higher unemployment, consistent with Lilien's earlier findings.
- Vacancies are negatively (but not statistically significantly) related to sectoral dispersion;
  - This is evidence that the sectoral dispersion index is just reflecting cyclical factors;
  - But, weaker evidence against Lilien's hypothesis than found by Abraham and Katz.
- Even if sectoral shifts do not raise the natural rate of unemployment, labor reallocations across firms, sectors, and time can be costly – with implications for macro dynamics and policy.

Models of costly labor allocation

- Role of costly labor adjustment in four illustrative models:

1. Quadratic costs of adjusting employment;
2. Search model with one sector;
3. Search with skill heterogeneity – composition effects;
4. Search model with two sectors – costly sectoral reallocation.

Example 1: Quadratic costs of adjusting labor

Lechthaler and Snower (2011)

- If it is costly for firms to adjust their employment levels, then hiring decisions and labor utilization decisions will need to be forward looking, just as price setting behavior is.
- This also means that these adjustment costs can affect marginal costs and inflation.
- This affects the way the economy responds to disturbances –i.e. economic dynamics are affected.
- Volatile employment generates costs that monetary policy can affect.
- Implies stabilizing employment changes is a legitimate objective of monetary policy along side inflation and output gap stabilization.

Response to a markup shock: optimal commitment

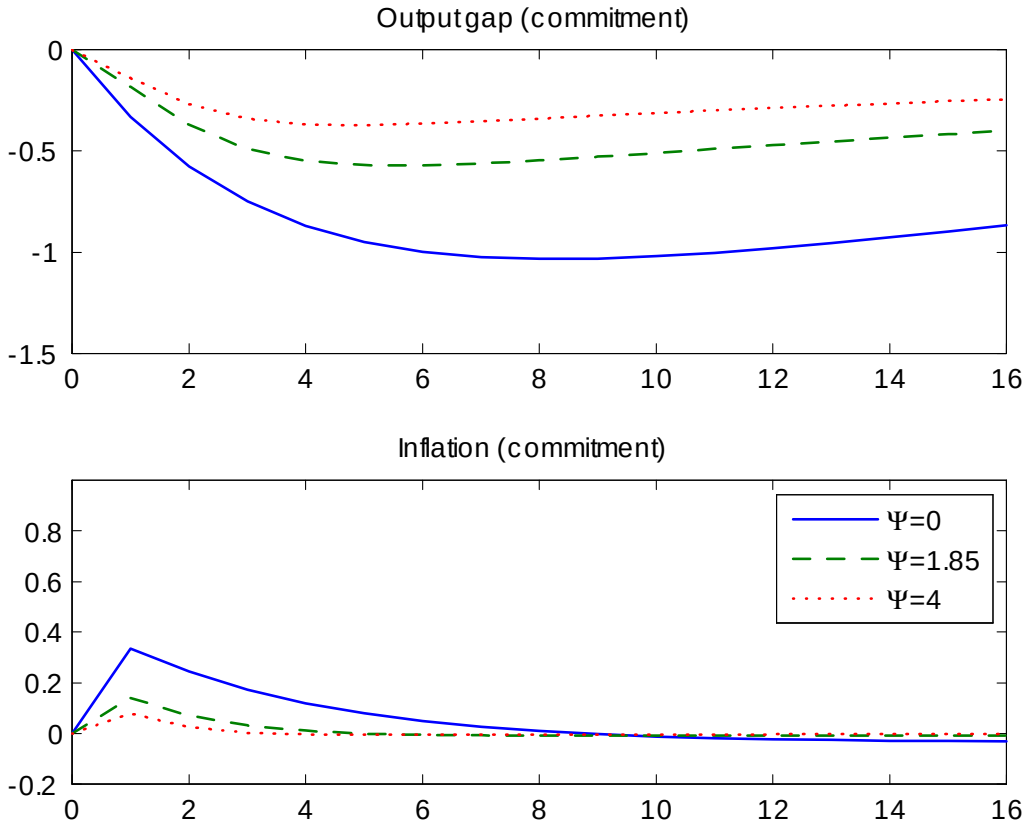

Figure: Optimal response under commitment to a serial correlated markup shock in the quadratic costs of adjustment model.

Discretion

Outcomes under Taylor rule and optimal policy

Table 3: Effects of Ψ: Welfare loss

	Taylor rule		Discretion		Commitment	
Ψ	σ_x	σ_π	σ_x	σ_π	σ_x	σ_π
0	4.57	1.73	3.44	3.44	4.74	0.49
1.85	2.35	0.89	2.21	1.18	2.37	0.17
4.0	1.50	0.56	1.47	0.46	1.49	0.09

- More costly labor adjustment reduces output and inflation volatility, but inflation volatility declines more.

Fixed loss function

Example 2: Costly labor market search

Ravenna and Walsh (2011)

- While many policy models are based on structures that assume labor can easily shift between uses, many policy models are beginning to incorporate more modern theories of unemployment based on the Mortensen and Pissarides search and matching model.
- The Mortensen-Pissarides approach recognizes that matching workers and jobs can be a costly process – costly in terms of time and resources.
- This approach has three important implications for policy:
  - it affects the dynamics of the economy;
  - it implies interest rates may have direct inflation effects;
  - it means labor market conditions are a legitimate concern of central banks.
- Ravenna and Walsh show the weight to give to labor market tightness is smaller when labor market is characterized by less turnover.

Details

Decline in vacancy yield

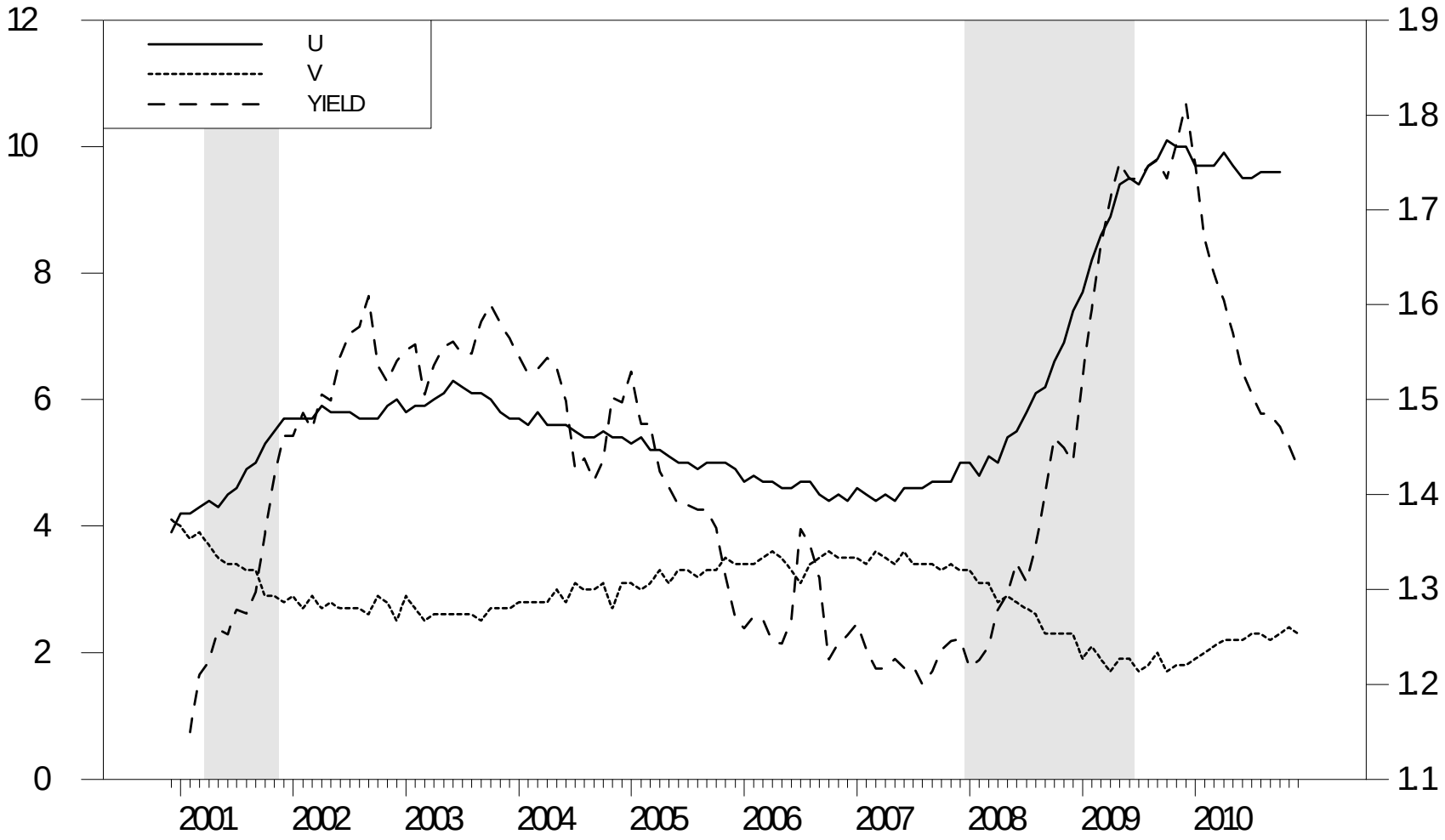

Figure: The U.S. unemployment rate, the vacancy rate, and the hiring yield (right scale).

Decline in vacancy yield

Figure: The hiring yield and forecasted yield based on labor market tightness (V/U). Forecast obtain from an OLS regreesion of the yield on a constant and V/U, 2000:12 - 2009:12.

Example 3: Skill heterogeneity

Ravenna and Walsh (2010)

- Low skill and high skill workers.
- Low skill worker more likely to experience job separation.
- In a recessions, the skill mix of the unemployed shifts towards low skill workers:
  - Reduces the vacancy yield rate as firms see more job applicants they don't want to hire;
  - Reduces incentive for firms to post vacancies;
  - Job finding rate falls because probability of finding a job for a low-skill worker falls *and* because low-skill workers become a larger share of the total unemployed.

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Example 4: Sector heterogeneity

- Two sectors, hiring costs are higher if worker previously employed in the other sector:
  - captures the idea that workers may have sector or job specific skills;
  - implies the composition of the pool of unemployed matters for job creation.
- Burst of unemployment in one sector pushes up unemployment but may weaken incentives for firms in other sectors to create job openings.
- Efficiency implications – employment reduction in one sector imposes a negative externality on firms in other sectors as average quality of the unemployed (from the perspective of other sectors) deteriorates.

Sector heterogeneity and costly labor search

A common productivity shock

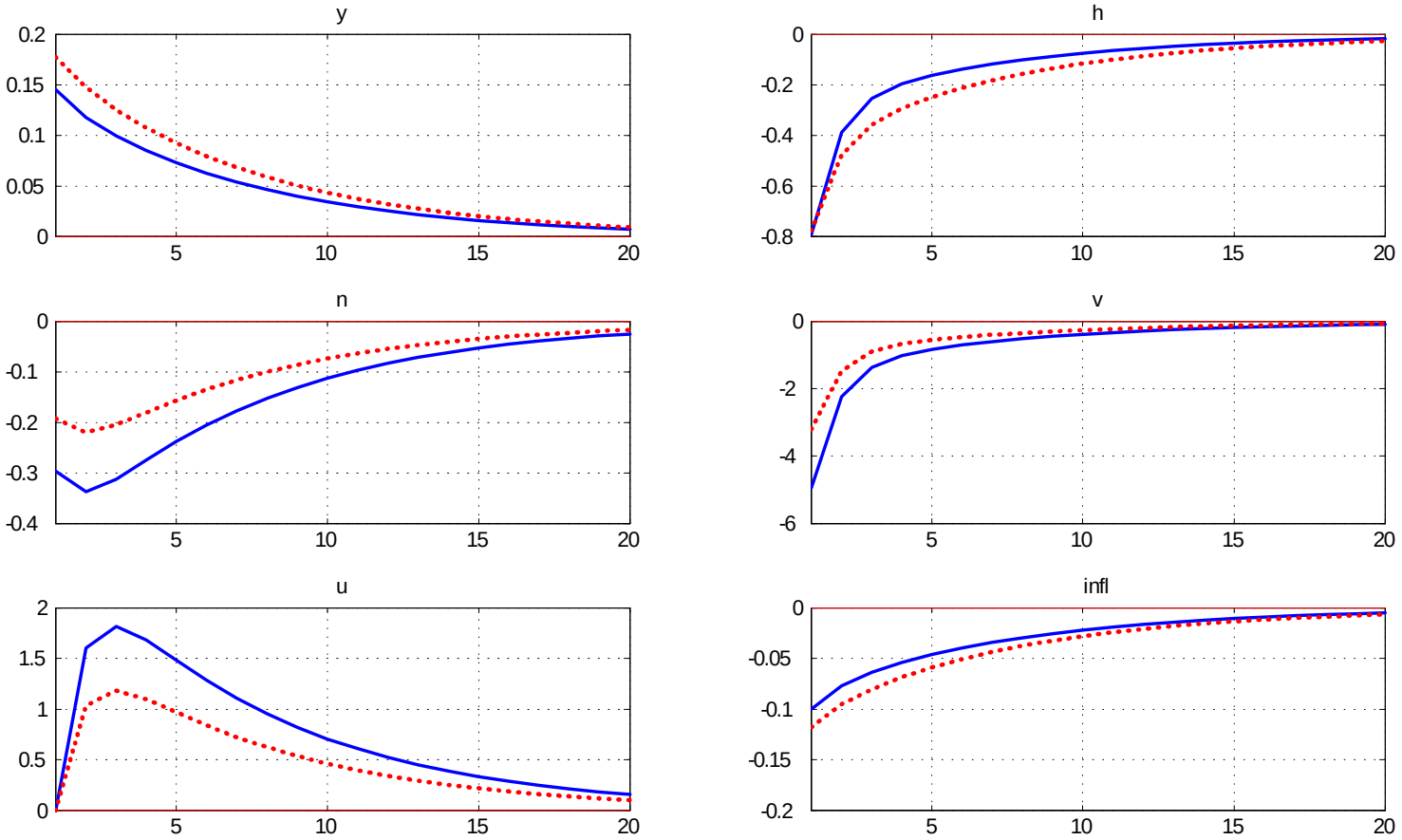

Figure: Impulse responses to a serially correlated productivity shock to both sectors: Solid line is model without composition effects.

Sector heterogeneity and costly labor search

A sector specific productivity shock

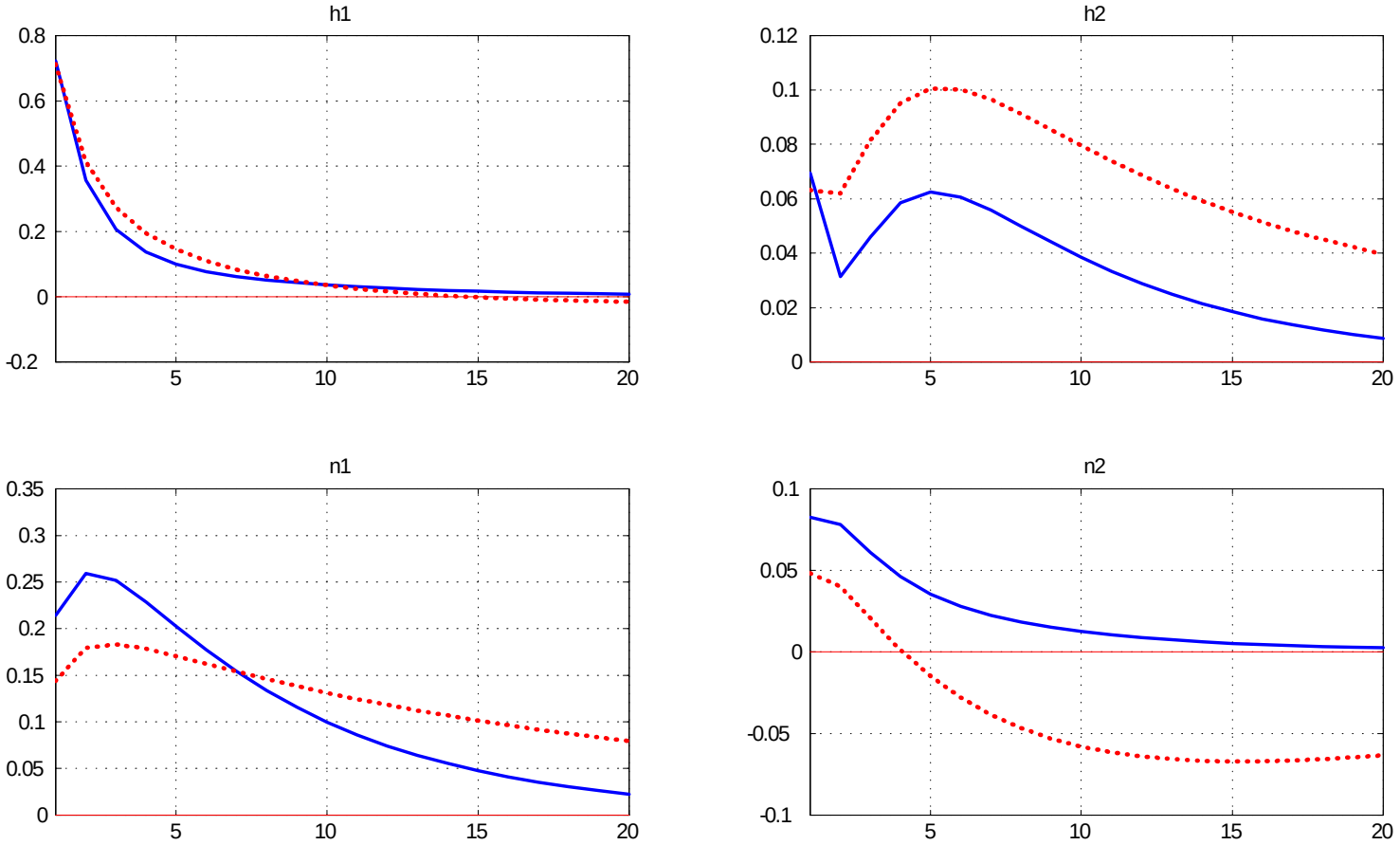

Figure: Impulse responses of hours and employment to a negative productivity shock only to sector 1: Solid line is model without composition effects.

Summary and implications

- Current DSGE policy models minimize costs of labor reallocation.
- The Great Recession in the U.S. does not overturn earlier conclusions about the link between sectoral dispersion and unemployment.
  - Evidence from Beveridge Curve and decline in vacancy yield suggests mismatch of workers and job openings may have increased.
- When labor reallocation is costly, the economy's dynamics and the cost of fluctuations are affected.
  - Role for labor market objectives.
  - Low turnover in labor markets can raise the importance of inflation stability.
  - Composition effects may be important for macro dynamics and therefore for policy objectives and for designing monetary policy.
- These general conclusions will apply to other factors of production and to other situations in which there are costs of adjustment that reflect the imperfect mobility of resources.

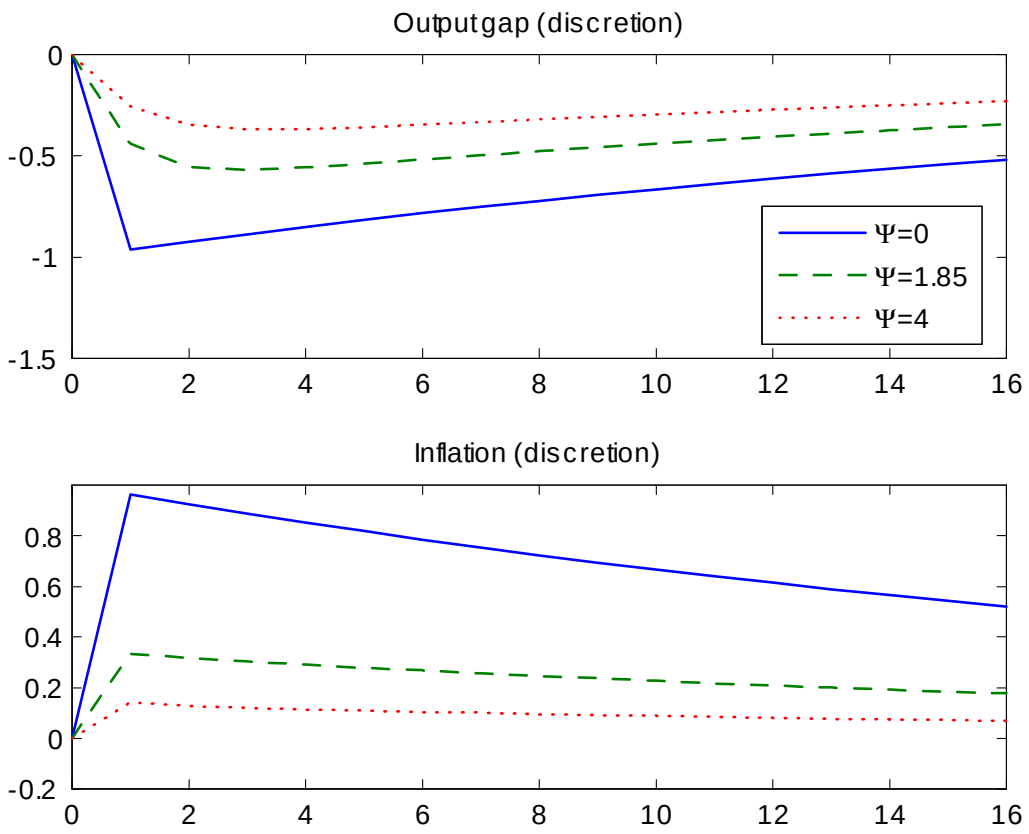

Figure: Optimal response under discretion to a serial correlated markup shock in the quadratic costs of adjustment model

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Outcomes with loss function fixed

Table 2: Effects of Ψ: Fixed loss

	Taylor rule		Discretion		Commitment	
Ψ	σ_x	σ_π	σ_x	σ_π	σ_x	σ_π
0	4.57	1.73	3.44	3.44	4.74	0.49
1.85	2.35	0.89	2.08	1.76	2.38	0.16
4.0	1.50	0.56	1.44	0.80	1.50	0.08

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Example 2: Costly labor market search

Ravenna and Walsh (2011)

- Mortensen and Pissarides search and matching model.
- Phillips curve takes the form

$$\pi_t = \beta \mathrm{E}_t \pi_{t+1} - \alpha_1 \tilde{u}_t + \alpha_2 \tilde{r}_t + \varepsilon_t.$$

  - Interest rate channel because labor costs depend on the PDV of a match.

- Social loss is

$$\mathcal{L}_t = \pi_t^2 + \lambda_0 \tilde{x}_t^2 + \lambda_1 \tilde{\theta}_t^2$$

  where $\tilde{\theta}$ is labor market tightness (all variables expressed relative to their efficient levels).

- Weight on labor market tightness is smaller when labor market is characterized by less turnover.

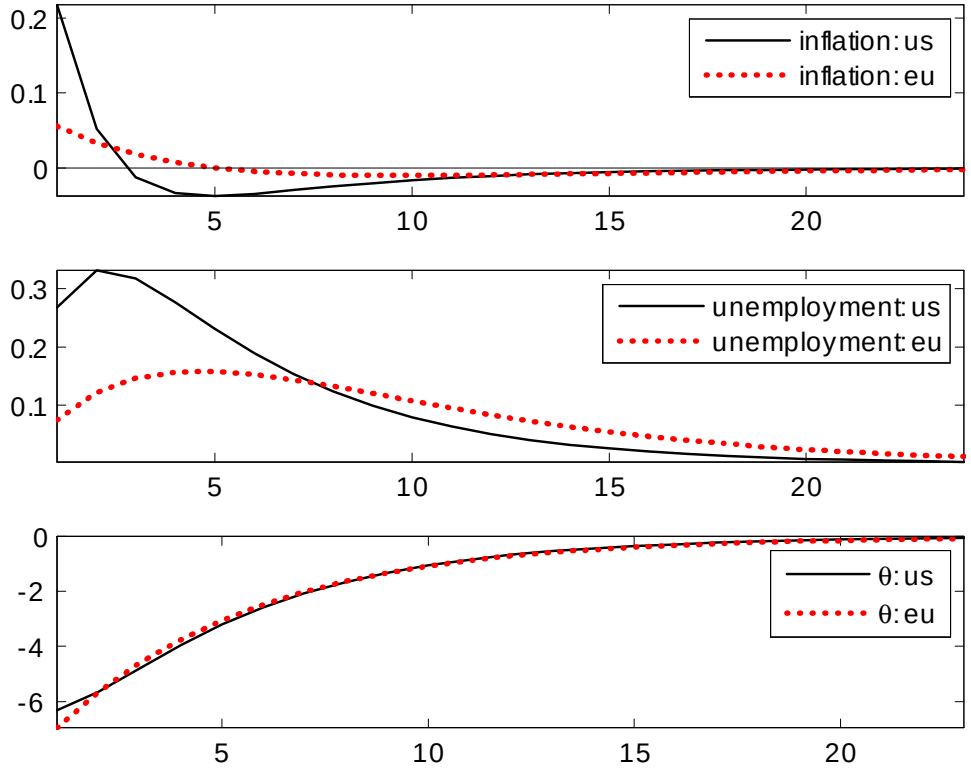

Figure: Responses to a one standard deviation bargaining shock for U.S. (solid line) and EU (dotted line) calibrations. (π and θ scaled in percentage point deviations from steady state; unemployment scaled as percentage points of total labor force).

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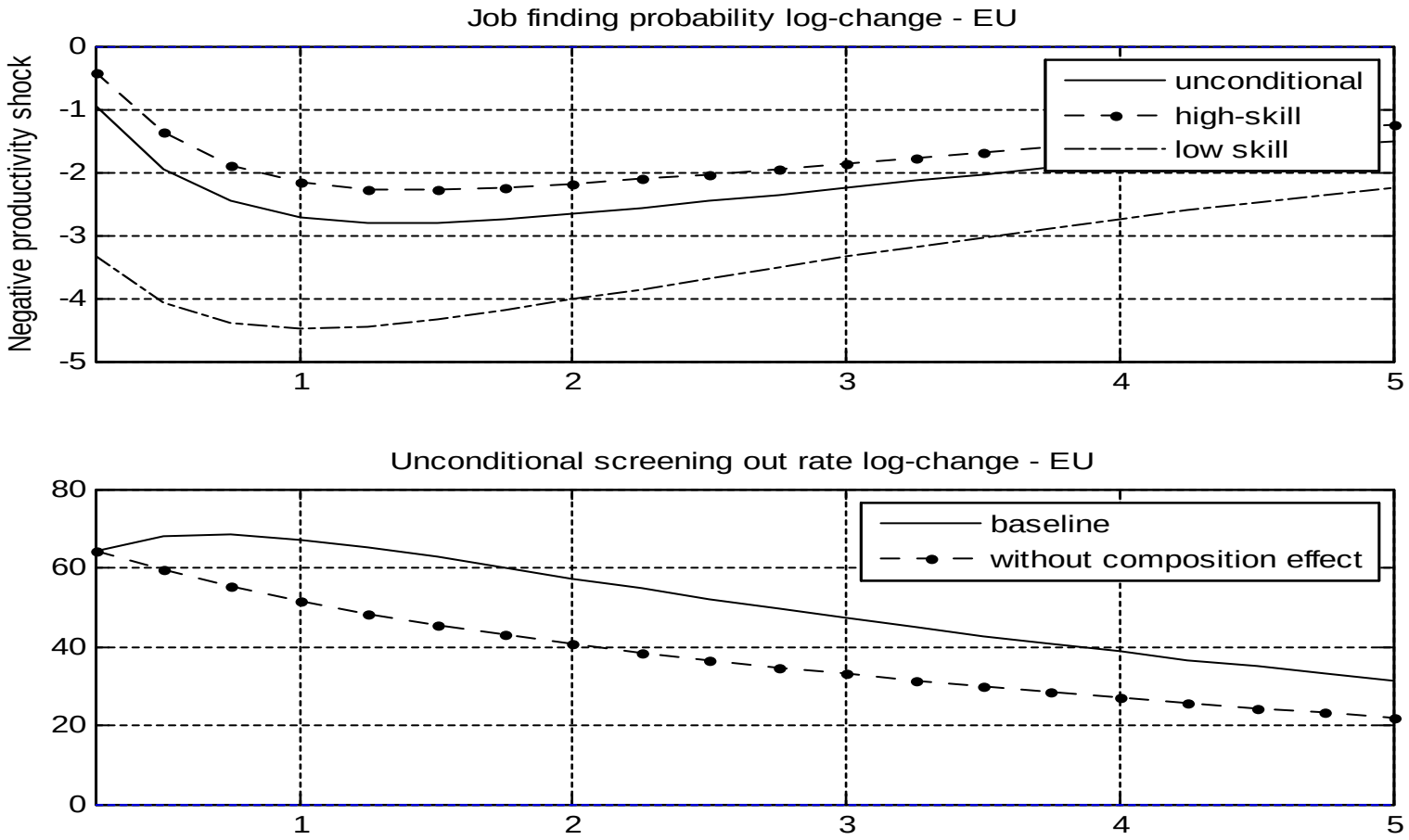

Figure: Skill heterogeneity: response to a negative productivity shock: Job finding and screening rates

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