Estimating incentive and welfare effects of non-stationary unemployment benefits

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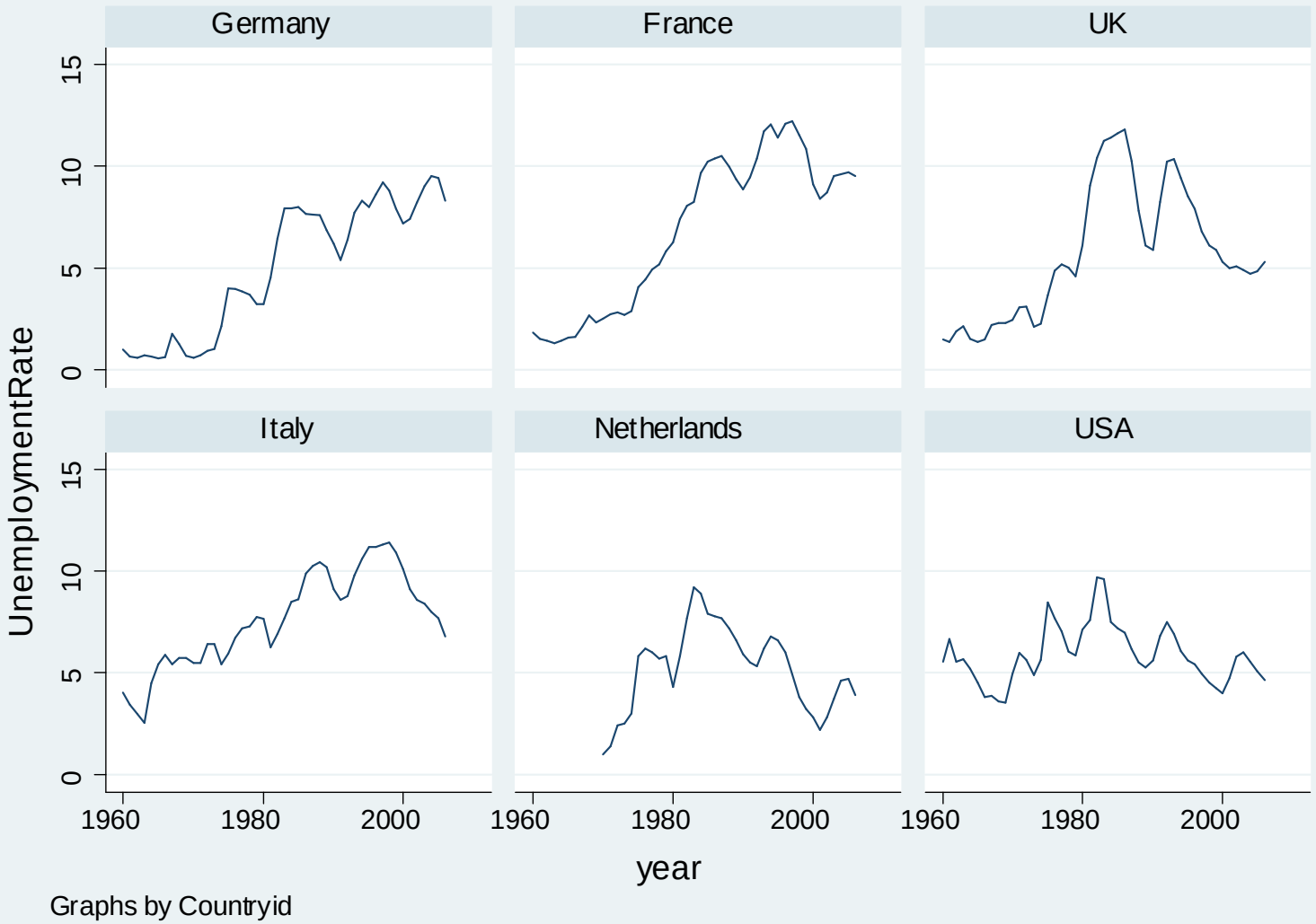
1. Introduction

European unemployment

- The starting point



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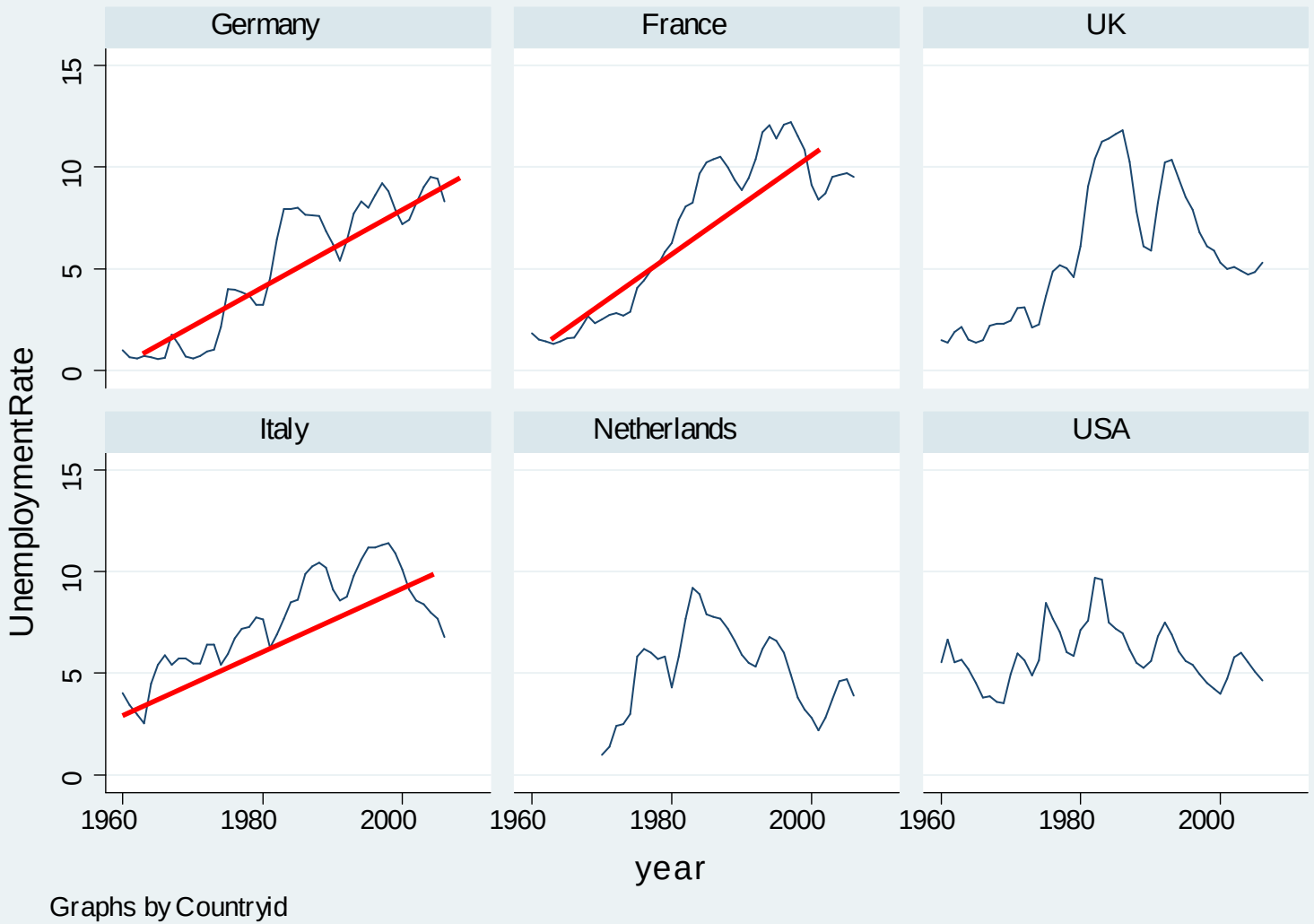

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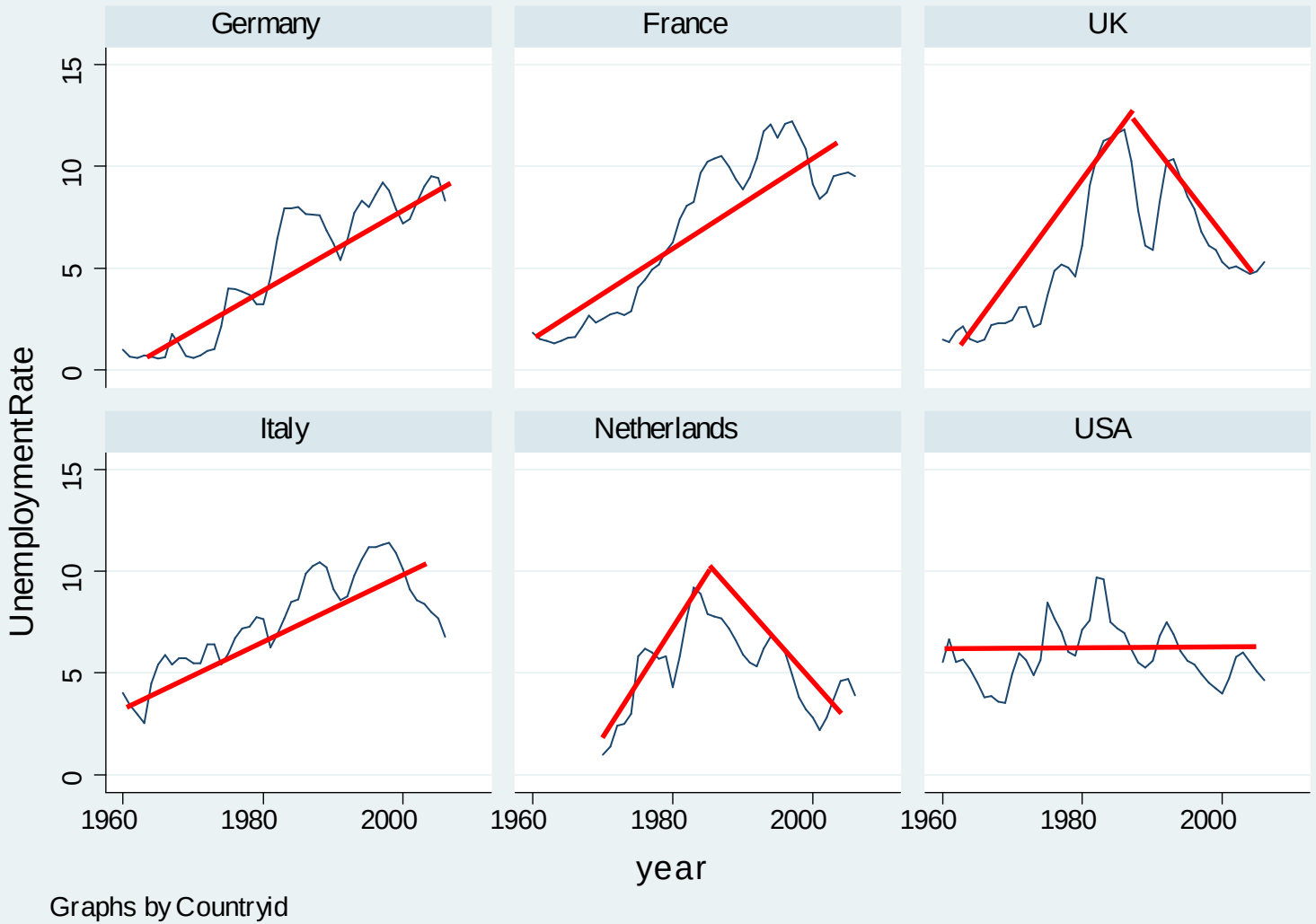

- The causes

Shocks? Institutions? Interaction of institutions?
$\longrightarrow$ Interaction of shocks and institutions!
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- Do we want this?

classic efficiency-equity trade-off
"solved" / addressed by many countries in different ways

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The example of Germany

How did Germany address the efficiency-equity trade-off?

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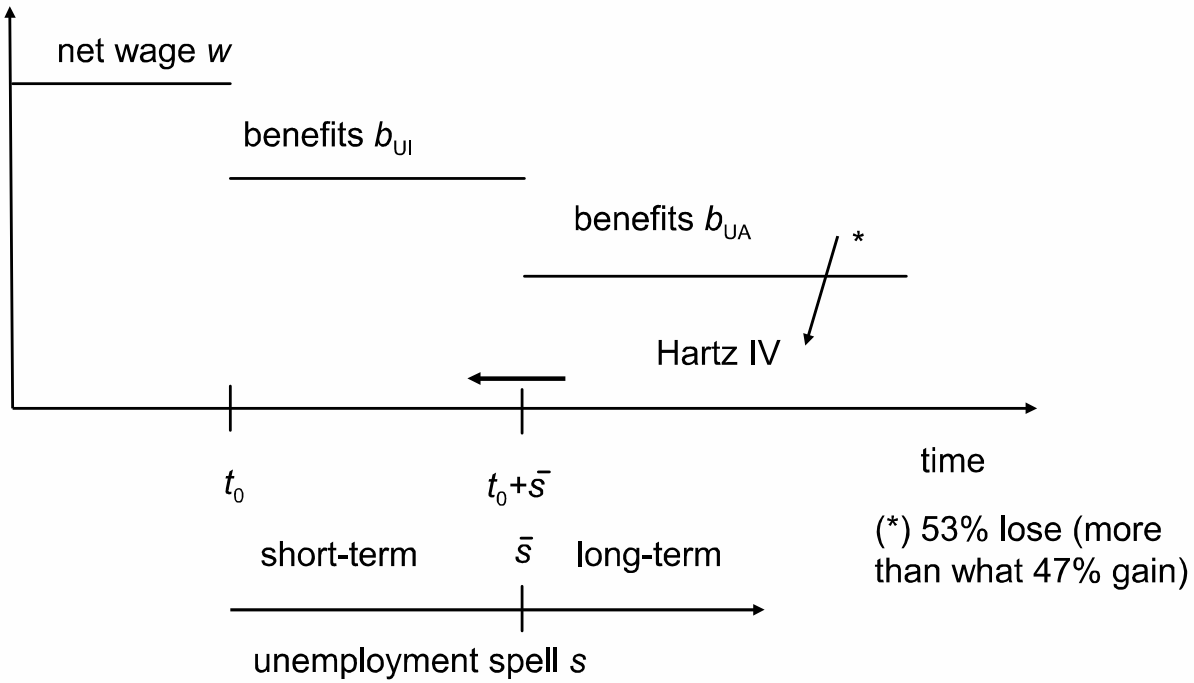
- Reduction of length and level of payments



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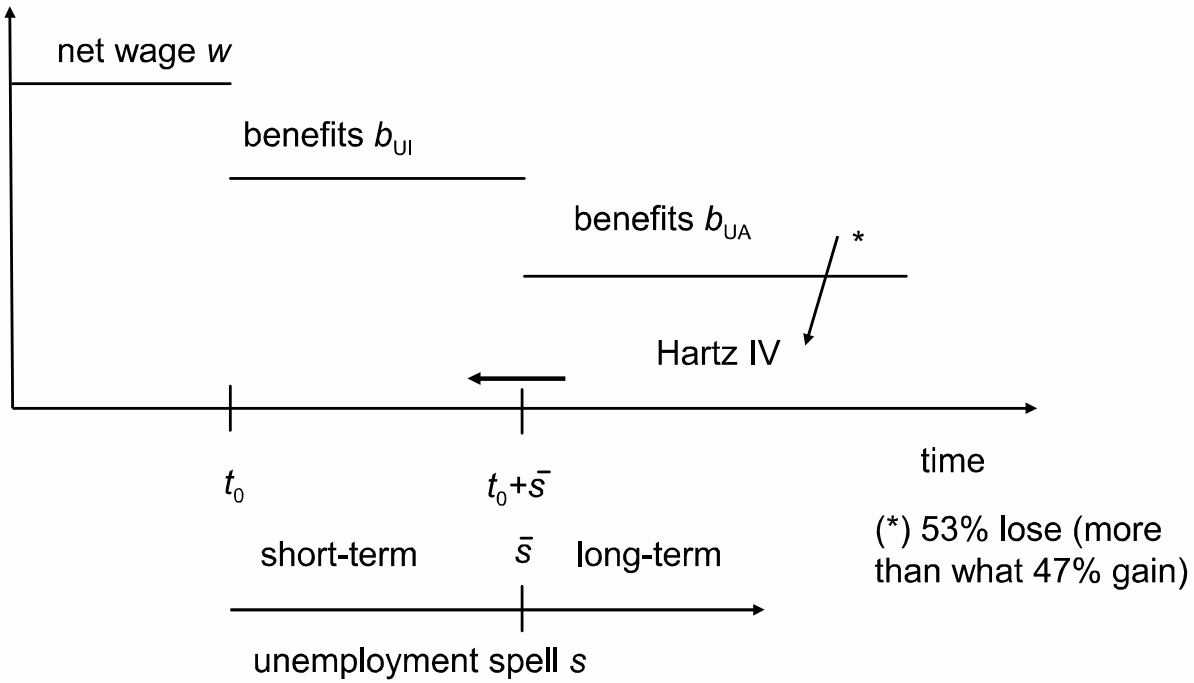

- How desirable are reforms of this type?
- Given risk-aversion, how do length and level of unemployment benefits affect social welfare/ insurance mechanism?

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Findings

Design of the reform

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- The net wage *in*creases for most groups (not for medium and high-skilled in East) – contradicting the general public perception

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- Firms gain ...
  ... as long as gross wages fall

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Results come from a macro model structurally estimated with micro data

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Structure of the talk

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2. The model
3. Equilibrium properties
4. Structural estimation
5. The effect of labour market reforms
6. Conclusion

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- Labour force (consider one skill group to start with)

  N labour force, $L(t)$ employed, $N - L(t)$ unemployed

  A output of worker-firm pair, λ exog. separation rate

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- Spell-dependent benefit system

$$b(s) = \begin{cases} b_{UI} \text{ for short-term unemployed,} & 0 \leq s \leq \bar{s} \\ b_{UA} \text{ for long-term unemployed,} & \bar{s} < s \end{cases}$$

  with replacement rate, e.g.

$$b_{UI} = \xi_{UI} w$$

  We choose $\bar{s}$ identical for all (value of having a job is then constant)

2. The model

- Exit rate(s) into employment $\mu(.)$

individual effort $\phi(s)$
labour market tightness $\theta \equiv V/U$
an individual's type $\chi \in \{0,1\}$ with subjective belief $p(s) \equiv$Prob$(\chi = 1)$

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$$\begin{array}{rl} \textit{objective} \text{ arrival rate:} & \mu(\phi(s)\theta, \chi) \\ \textit{subjective} \text{ arrival rate:} & \mu(\phi(s)\theta, p(s)) \end{array}$$

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- Government budget constraint

$$\kappa \frac{w}{1-\kappa} L = b_{UI} U_{short} + b_{UA} U_{long}$$

where κ is the tax rate on gross wage and w is the net wage

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Collective wage setting

- Wage equation

$$(1-\beta)\, u(w_k) + \beta m_{w_k}(.)\, w_k =$$

$$(1-\beta)\, u(b_{UI,k}, \phi_k(0)) + \beta(1-\kappa)\, m_{w_k}(.) \left[A_k + \gamma_k \theta_k \frac{\mu(\phi_k(0), 0)}{\bar{\mu}_k} \right]$$

where

$$m_{w_k}(w_k, b_{UI}, \phi_k(0)) \equiv u_w(w_k) + \frac{\lambda_k}{\rho + \mu(\phi_k(0), 0)} u_w(b_{UI,k}, \phi_k(0))$$

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- Semi-Markov setup

  probability $\left\{ \begin{array}{c} p_{eu}(\tau) \\ p_{uu}(\tau, s(t)) \end{array} \right\}$ of a person $\left\{ \begin{array}{c} \text{employed} \\ \text{unemployed} \end{array} \right\}$ in t to be unemployed in τ, given current spell $s(t)$

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- Volterra integral equations for $s(t) = 0$

$$p_{uu}(\tau, 0) = e^{-\int_t^\tau \mu(s(y))dy} + \int_t^\tau e^{-\int_t^v \mu(s(y))dy} \mu(s(v)) p_{eu}(\tau - v) dv$$

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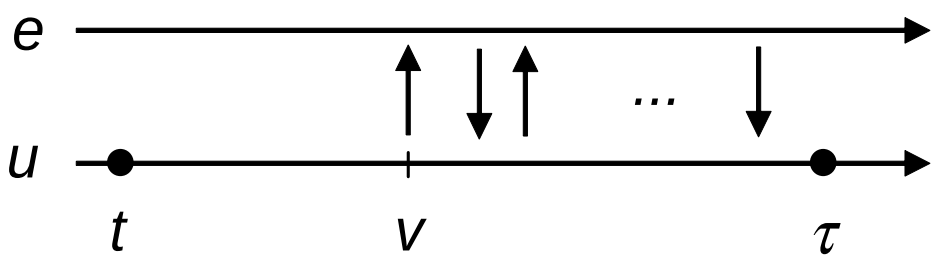

- Steady state with pure idiosyncratic risk

$$\frac{U}{N} = \frac{p_{eu}}{p_{eu} + \int_0^\infty p_{ue}\left(s\left(t\right)\right) dF\left(s\left(t\right)\right)}$$

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- Link to text-book model

$$p_{eu} = \frac{\lambda}{\lambda + \mu},\ p_{ue} = \frac{\mu}{\lambda + \mu} \Rightarrow \frac{U}{N} = \frac{\lambda}{\lambda + \mu}$$

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- Aggregation over all groups K and types

$$u_k = \pi^\chi u_{k,1} + \left(1 - \pi^\chi\right) u_{k,0}, \qquad u = \Sigma_{k=1}^n \frac{N_k}{N} u_k$$

3. Equilibrium properties

3.3 Steady state

Functional forms

- Utility function

$$u\left(b\left(s\right),\phi\left(s\right)\right)=\frac{b\left(s\right)^{1-\sigma}-1}{1-\sigma}-\phi\left(s\right)$$

- *Objective* arrival rate

$$\mu\left(\phi\left(s\right)\theta,\chi\right)=\left(\left(1-\chi\right)\eta_{0}+\chi\eta_{1}\right)\left[\phi\left(s\right)\theta\right]^{\alpha},$$

- *Subjective* arrival rate

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Evolution of the belief

$$\frac{dp\left(s\right)}{ds}=-p\left(s\right)\left(1-p\left(s\right)\right)\left(\mu\left(\phi\left(s\right)\theta,1\right)-\mu\left(\phi\left(s\right)\theta,0\right)\right)<0$$

4. Estimation

4.1 Data and estimation method

Data (GSOEP)

- flow sample of entry into (un)employment (each month of 1997 and 1998), giving us total of 743 individuals
- (un)employment duration in current state and employment history of unemployed, giving us: l, s, b_{UI}, b_{UA}, $\bar{s}$, w plus socio-econ.variables $\mathbf{x}$

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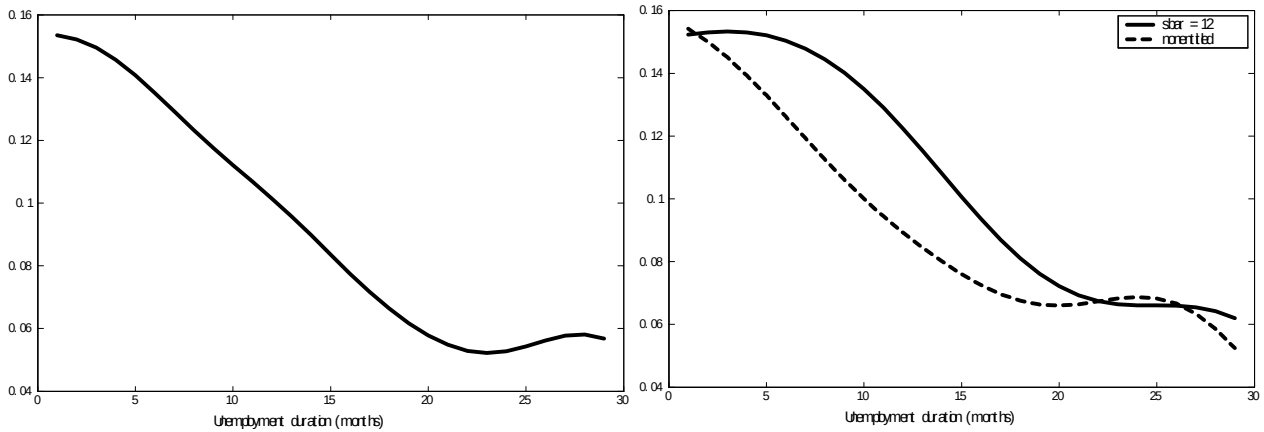
Non-parametric exit rates



- falling exit rates could be individual belief or unobserved heterogeneity
- providing a good fit is important for credibility of policy evaluation

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Maximum likelihood estimation

- Individual variables: $\mathbf{z} = \{b_{UI}, b_{UA}, \bar{s}, w, \theta\}$,
  $\mathbf{x} = \{\text{sex, region, skill, age}\}$
- unobs. heterogeneity: (i) matching rate parameter $\eta(\mathbf{x}, \nu)$
  (ii) π^{UA} share of individ. who pass UA means test
- Parameter set: $\xi = \left\{\alpha, \sigma, \pi^{UA}, \nu, \pi^{\chi}, \zeta_{\lambda}, \zeta_{\eta}\right\}$

Duration model with structural densities

4. Estimation

4.2 Estimated model parameters

- Parameters without slope coefficients (see paper for more)

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		Coeff.	SE	z-Stat.	p-Value
ζ_λ:	(intercept)	−4.4948	0.0566	−79.4364	0.0000
ζ_η:	(intercept)	−4.0928	0.5368	−7.6242	0.0000
α		0.4059	0.1306	3.1085	0.0019
σ		0.7639	0.2013	3.7954	0.0001
π^{UA}		0.2447	0.0311	7.8666	0.0000
ν		1.6974	0.4216	4.0259	0.0001
π^{χ}		0.9246	0.0402	22.9807	0.0000

rates	
λ	0.010
$\mu(s)$	see figure
$\bar{\mu}$	.11

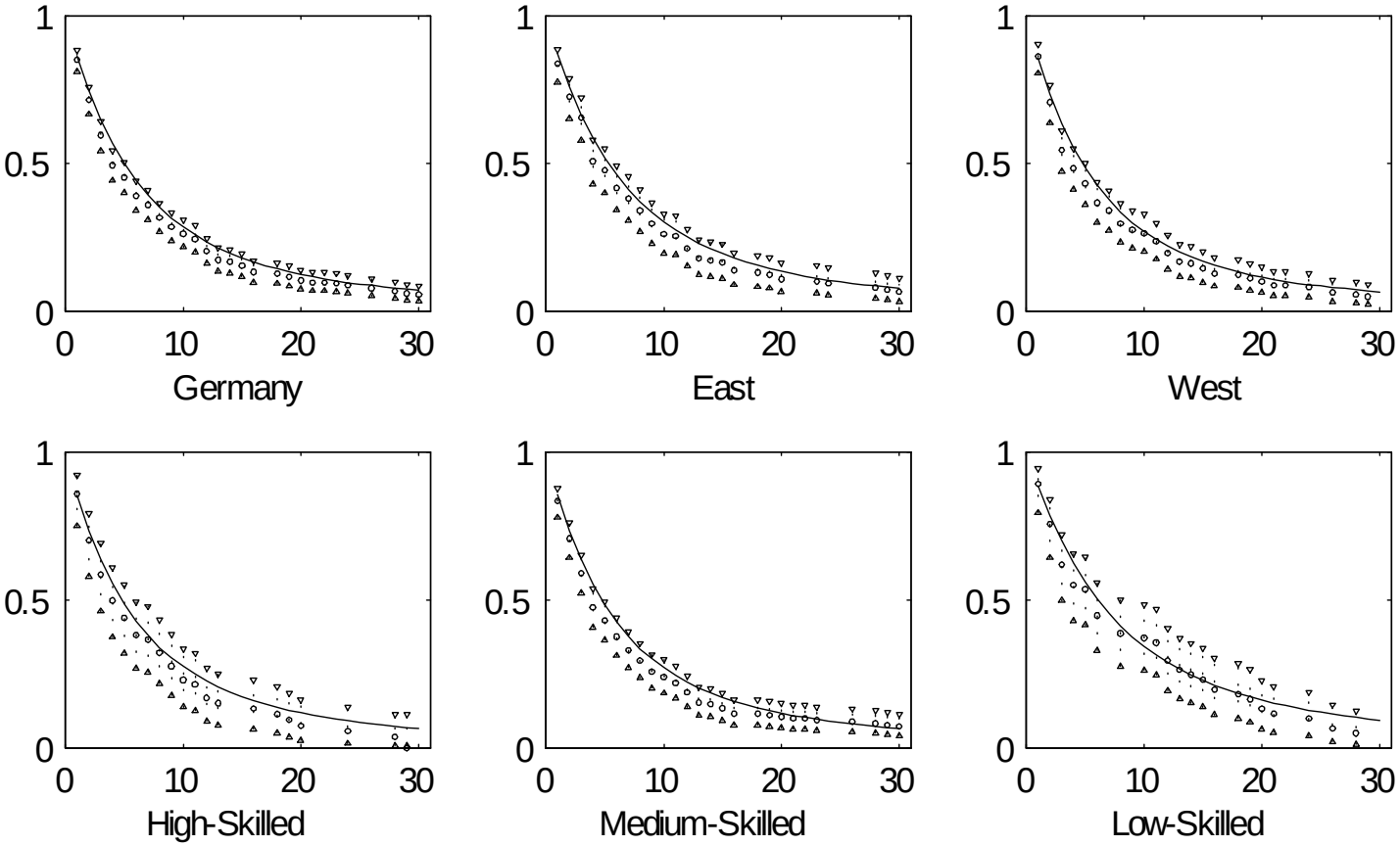
- functional forms (reminder)

$$u\left(b\left(s\right),\phi\left(s\right)\right)=\frac{b\left(s\right)^{1-\sigma}-1}{1-\sigma}-\phi\left(s\right)$$

$$\mu\left(.\right)=\eta\left(s\right)\left[\phi\left(s\right)\theta\right]^{\alpha},\quad\eta\left(s,\mathbf{x}\right)=\left(1-p\left(s\right)\right)\eta_0+p\left(s\right)\eta_1$$

$$\eta_0\equiv e^{\mathbf{x}'\zeta_\eta},\quad\eta_1\equiv e^{\mathbf{x}'\zeta_\eta+\nu},\quad\lambda\left(\mathbf{x},\nu\right)=e^{\mathbf{x}'\zeta_\lambda}$$

predicted survivor functions (solid lines with 95% confidence intervall) and Kaplan-Meier survivor probabilities (circles)



5. Evaluating labour market reforms

5.1 Pre-reform steady state

Strategy

1. take estimated model as a description of pre-reform steady state
2. undertaken comparative static analysis of reform measures (b_{UA}, $\bar{s}$) using the equilibrium model
3. do this for 6 groups: East- and West-Germany times three skill groups based on education level (low, medium, high)

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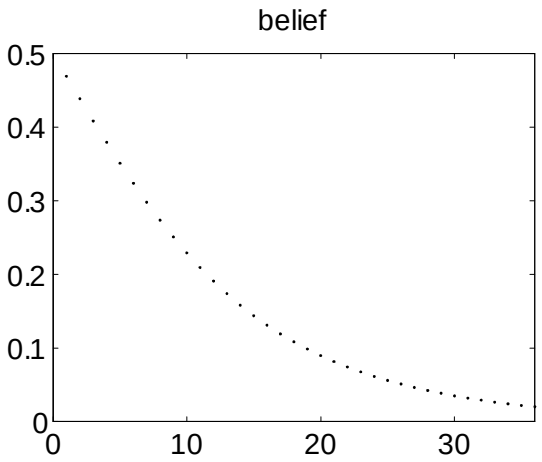

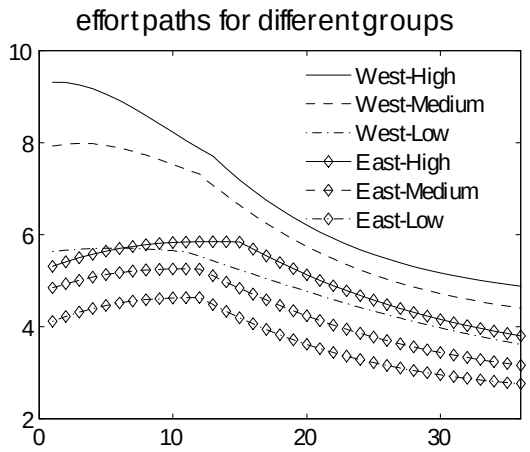

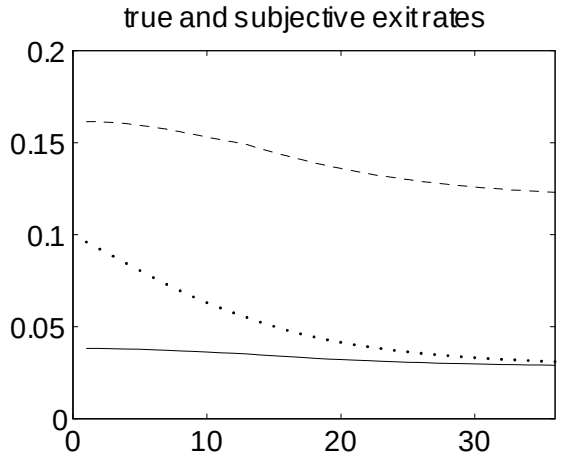

5. Evaluating labour market reforms

5.2 The effects of the reform

- The reform (reminder of broad idea)

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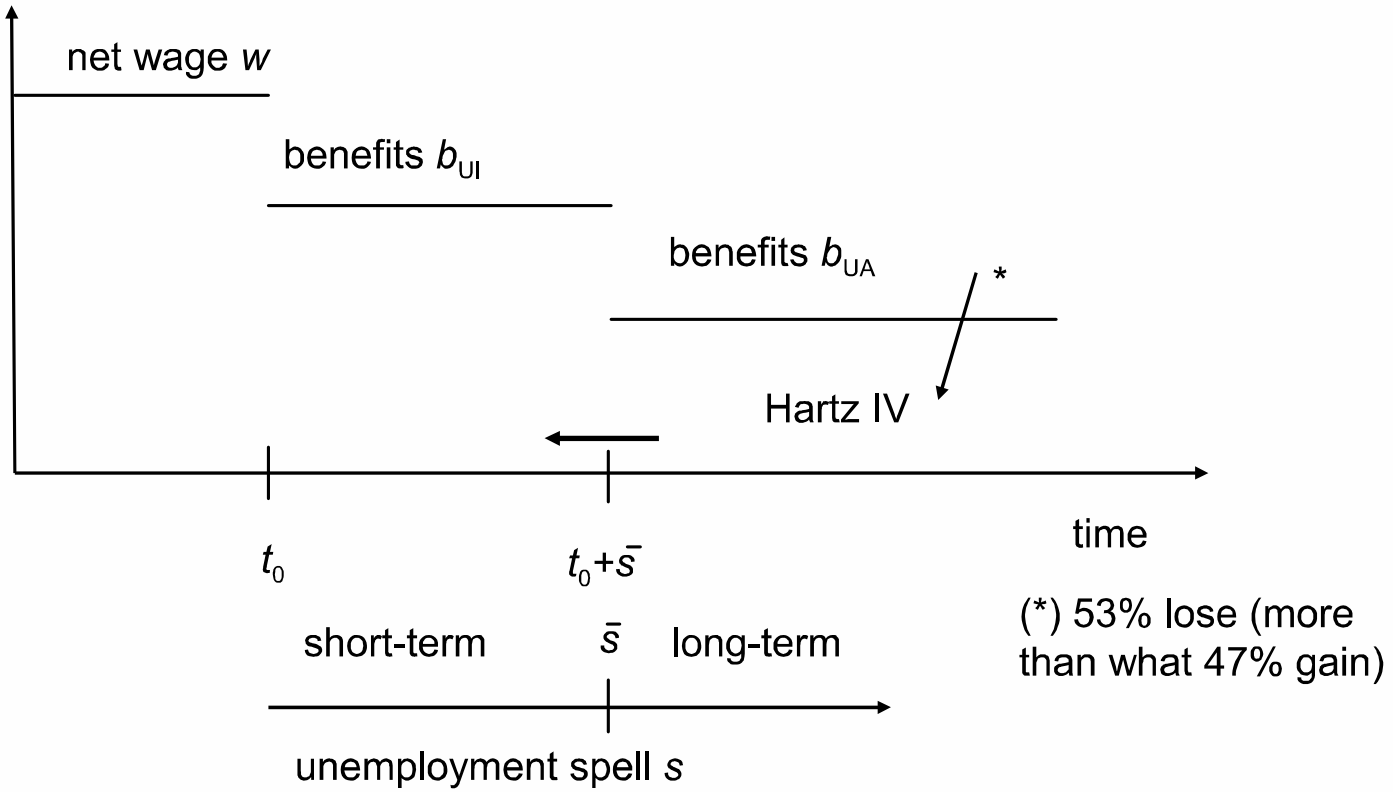

5. Evaluating labour market reforms

5.2 The effects of the reform

- The reform (in detail)

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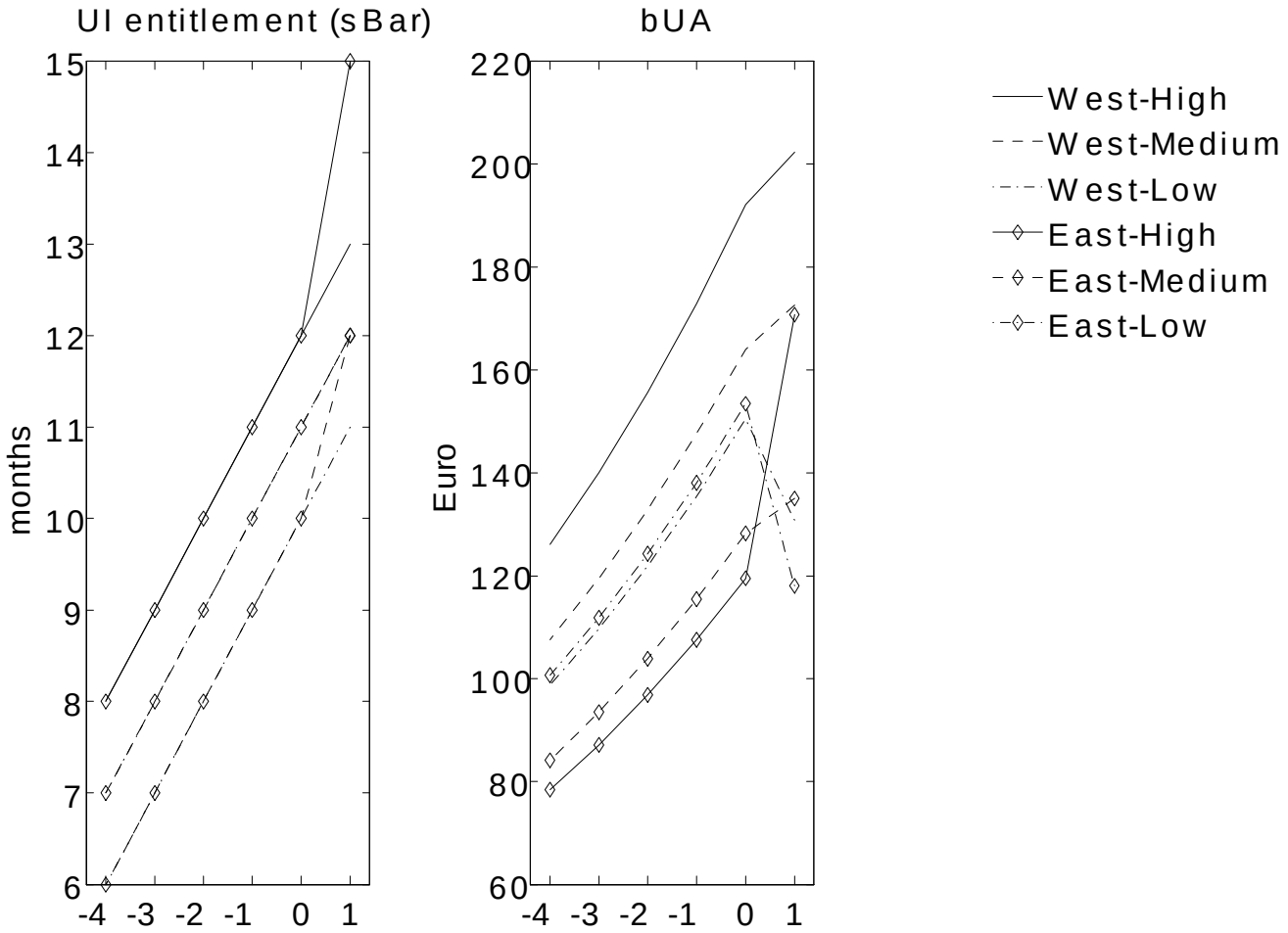

- (Joint) Aggregate effects of UA payments and entitlement length

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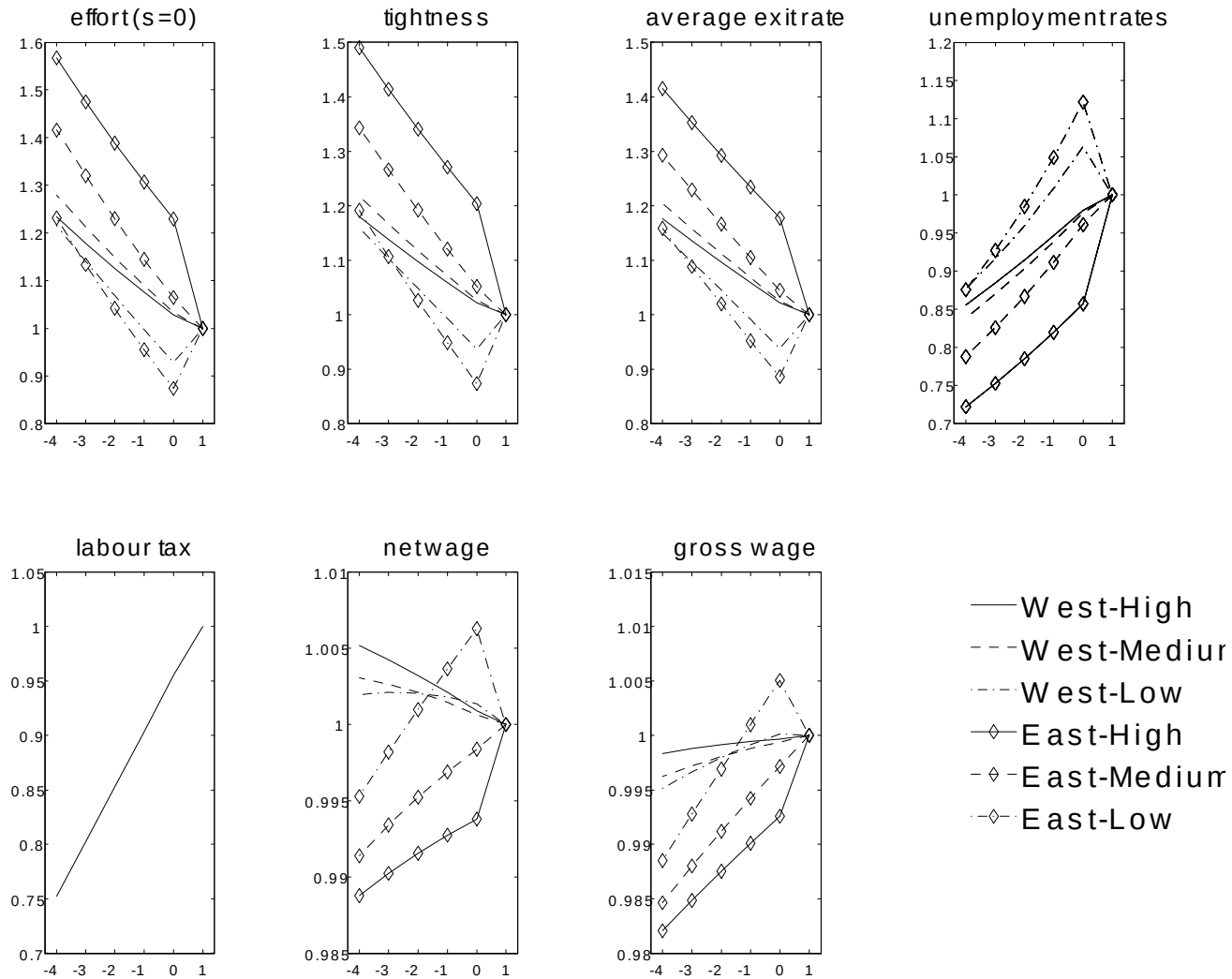

- (Joint) Distributional effects of UA payments and entitlement length

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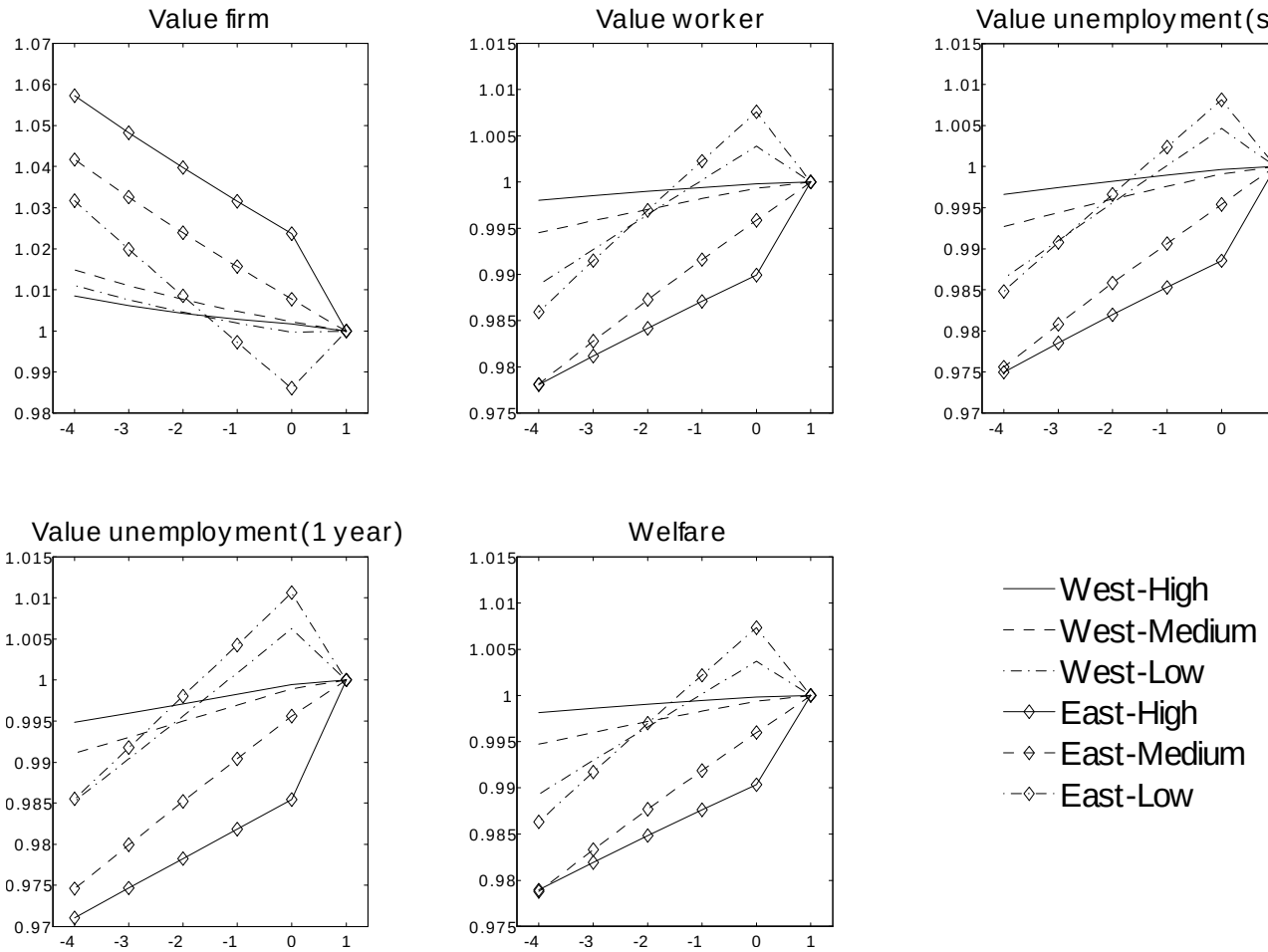

The messages (distribution)

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- Two groups are favoured by the reform ...
- but four groups gain in terms of net wage ...
- yet, only two groups gain in intertemporal sense

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  new fixed UA level is higher than previous proportional UA level
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- Only two groups gain in intertemporal sense ...
  The value of being employed falls for all but those favoured by the reform, gain in net wage is not enough to overcompensate the expected loss once unemployed

The messages (efficiency)

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- The reduction of unemployment rates by skill groups in percentage points

West-High	W-Medium	W-Low	East-High	E-Medium	E-Low
0.08%	0.17%	-1.23%	2.42%	0.82%	-3.05%

- Groups with highest unemployment rates even experienced an increase in unemployment rates
- Overall effect basically zero

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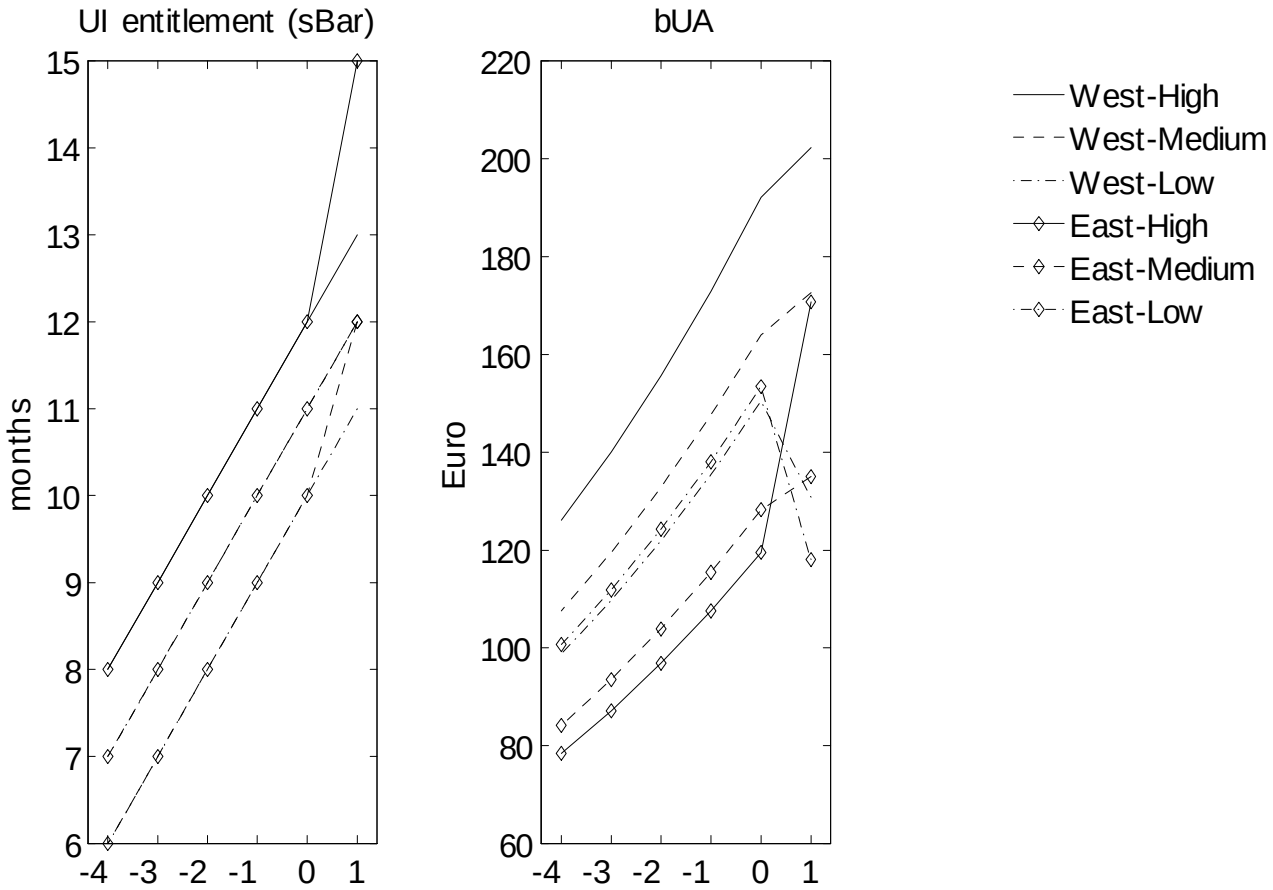

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- Effects are all small
- Reduction of b_{UA} and $\bar{s}$ by $1/3$ reduces unemployment rate by only $1/5$
- One needs to pay a "high price" for a "low benefit"
- Welfare effects would be negative of course as well

6. Conclusion

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Background

- European unemployment has been fought successfully in many countries
- there is more than output and employment in life, however
- what about insurance effect of UI systems?

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- Spell-dependent unemployment benefits
- Endogenous individual duration dependence

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Methodological results - Derivation of

- Learning behaviour leading to downward-sloping individual duration dependence
- Individual unemployment probabilities using semi-Markov structure
- Aggregate unemployment rate
- Close theory-data link

6. Conclusion

Economic results

- Unemployment rates do not fall for all groups – promise of the reform not held
- The group with highest unemployment rate experiences an even higher rate due to the reform (low-skilled in East and West)
- If reform reduced benefits for all groups, employment would rise for all

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Bad reform!

Thank you!