Training or Search?

Evidence and an Equilibrium Model

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Outline of the Work

1. Develop a structural framework which include:
   - search
   - training
   - unemployment benefits
2. Use German data to estimate the model.
   - data: Integrated Employment Biographies Sample
   - methodology: Simulated Methods of Moments
3. Quantitatively study the actual policy reforms in Germany and assess alternative policies.

Training for Unemployed Workers in OECD Countries

Table: Training Programs for Unemployed Workers (2002)

	EXPENDITURE					PARTICIPATION	
COUNTRY	Training *(GDP %)*	UB *(GDP %)*	Total LMP *(GDP %)*	Training *(ALMP %)*	Training+UB *(LMP%)*	Training *(LF %)*	UB *(LF %)*
Denmark	0.67	1.37	4.6	48.2	44.1	5.8	19.6
Belgium	0.19	1.94	3.6	16.7	58.4	3.4	-
Netherlands	0.52	1.72	3.6	29.5	62.9	1.4	5.2
Germany	0.32	2.10	3.3	27.1	73.1	1.2	-
Finland	0.27	1.53	3.1	27.6	58.6	2.5	-
France	0.21	1.39	2.9	16.7	54.8	1.7	7.1
Sweden	0.28	1.04	2.5	20.1	53.9	2.5	-
Spain	0.12	1.55	2.4	15.6	69.0	2.2	1.6
Switzerland	0.12	0.77	1.3	23.1	68.5	1.7	11.2
United States	0.03	0.55	0.7	20.0	81.7	0.9	-

LMP - Labor Market Policies; ALMP - Active Labor Market Policies;
UB - Unemployment Insurance Benefits; LF - Labor Force
Note: Data for Denmark is from 2000; France and United States' data are from 2001.
Source: OECD Employment Outlook (2004)

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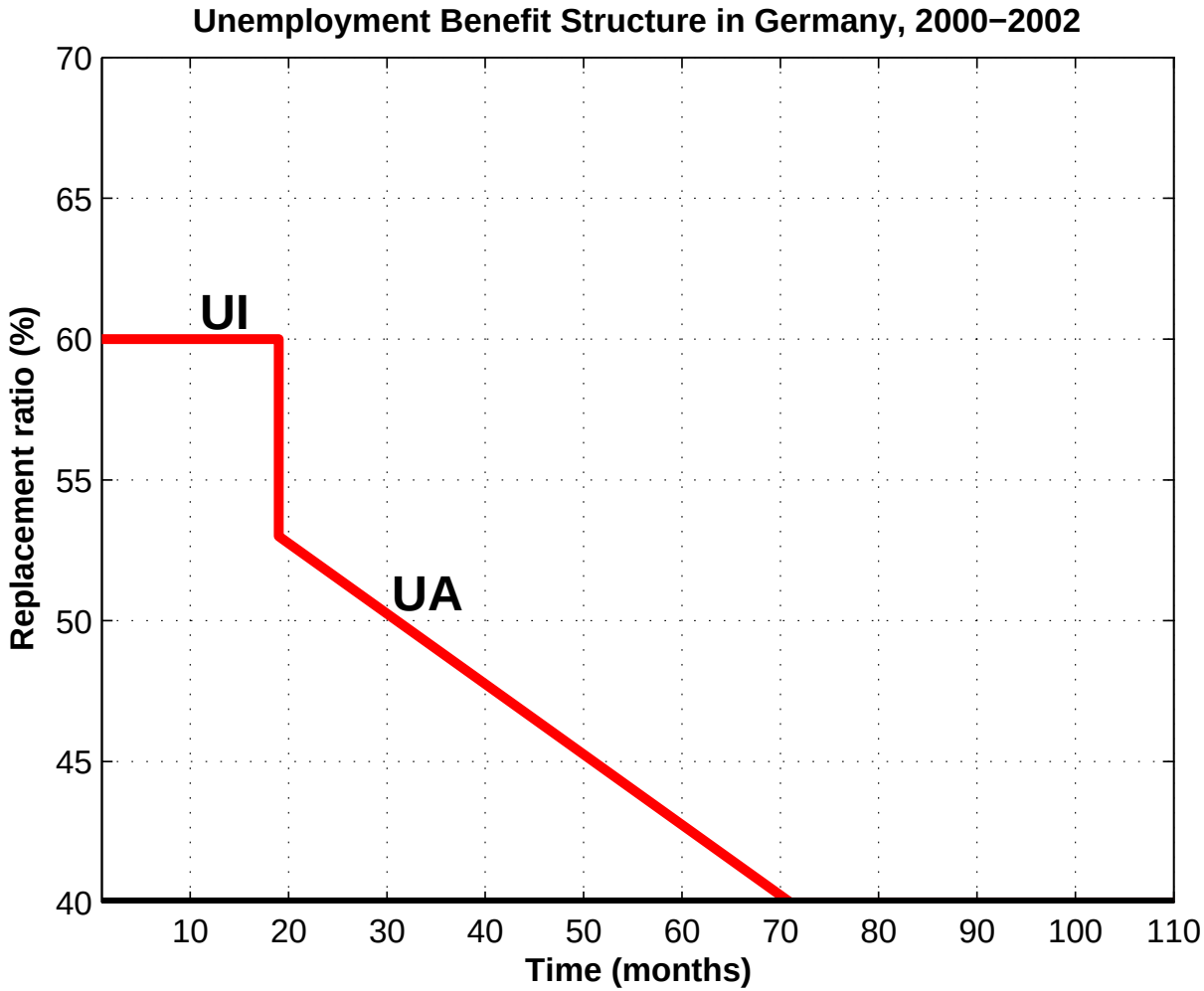

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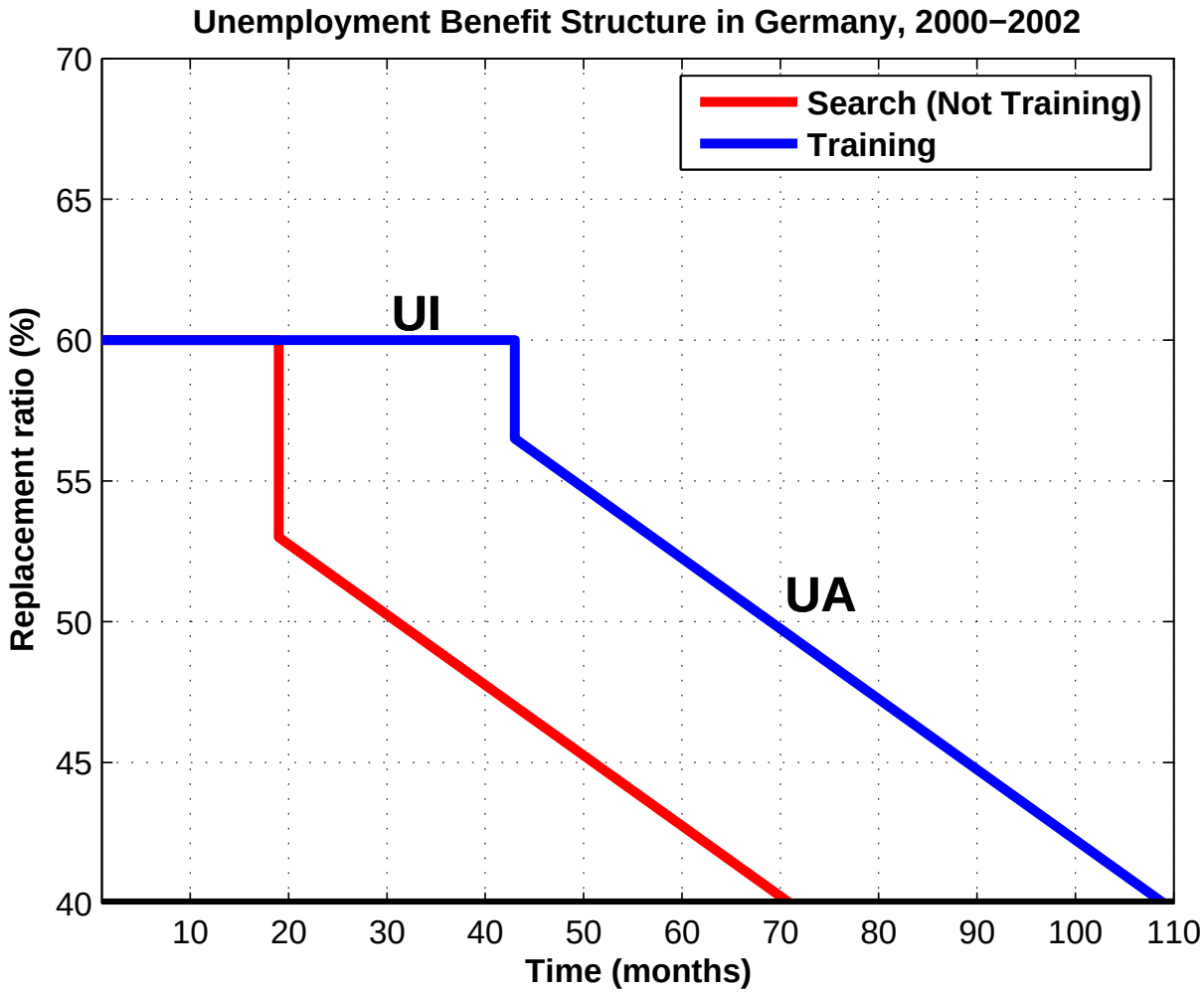

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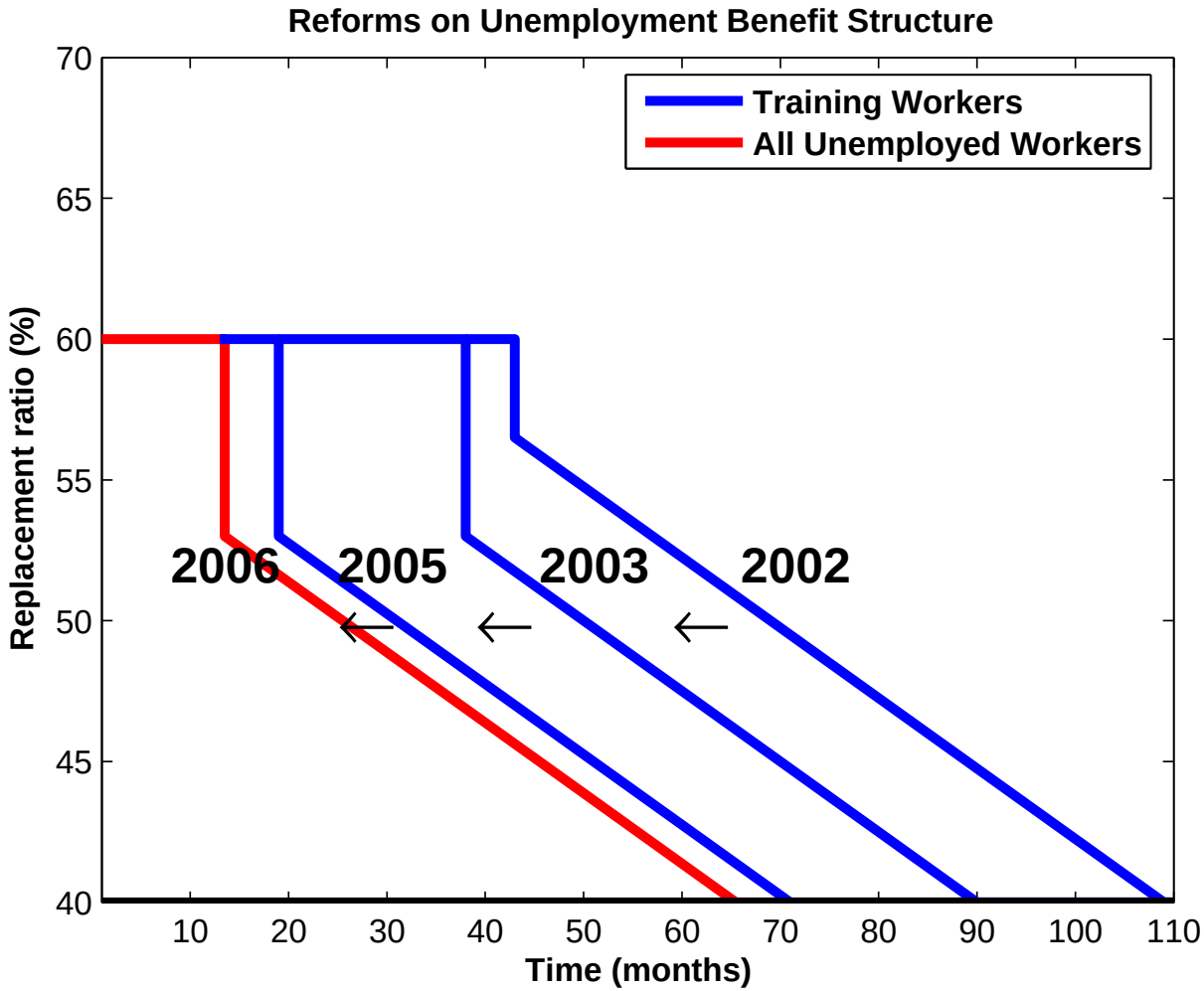
Reforms on Unemployment Benefit Structure



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Questions

- How large are the effects of these policy reforms on the unemployment rate, employment rate and output?

The Model

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McCall (QJE, 1970) and Ljungqvist and Sargent (JPE, 1998)

+ a training decision
+ a broader menu of unemployment benefits

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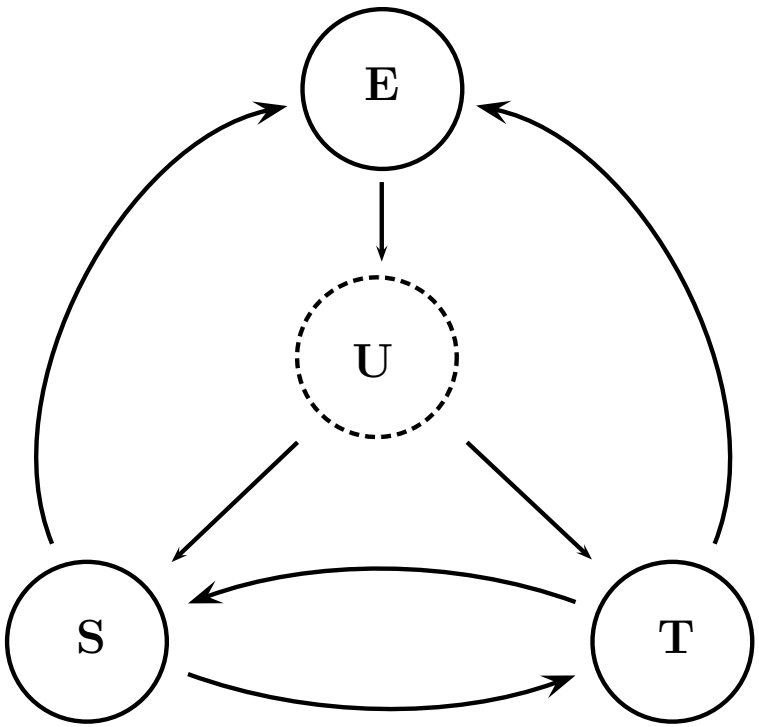

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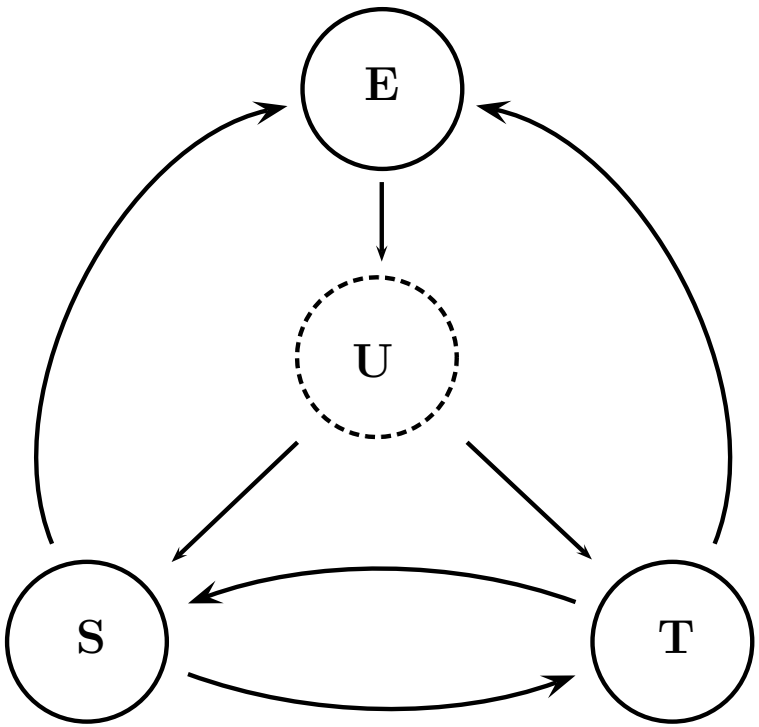

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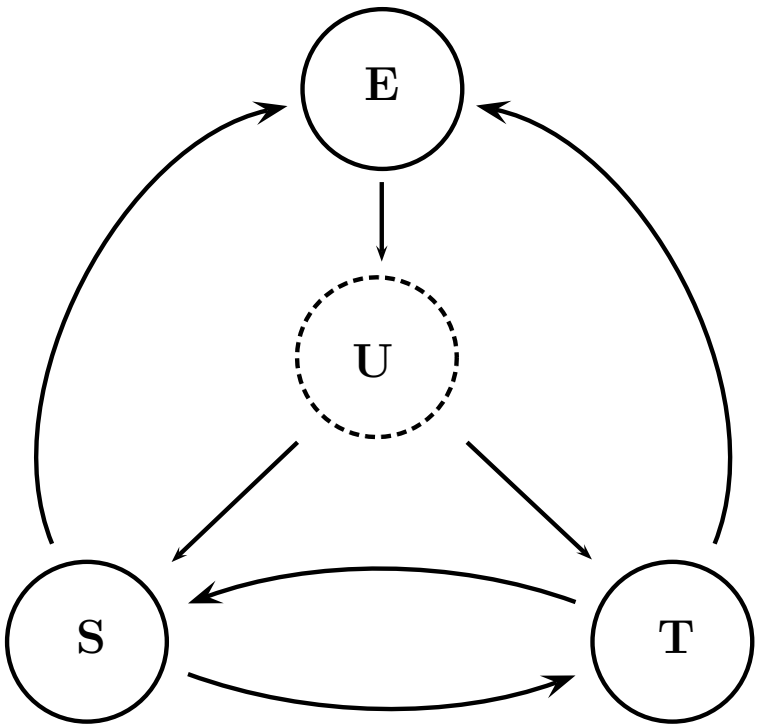

E – Employment; U – Out of Work; S – Search; T – Training

- Workers' human capital changes with their labor market experiences.
- Workers are risk neutral, their earnings (I) are determined by $I = wh$
  - h: human capital level
  - w: wage rate per unit of human capital.

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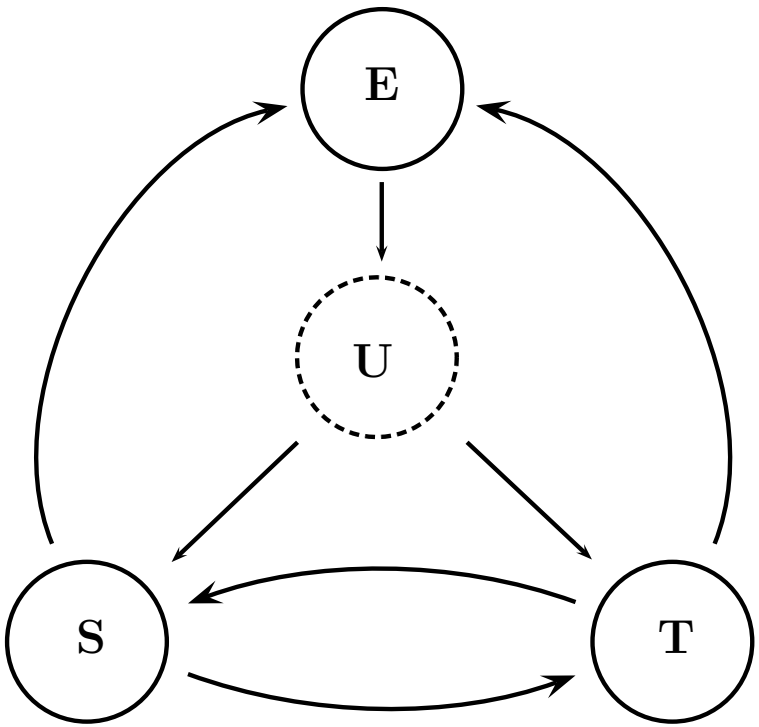

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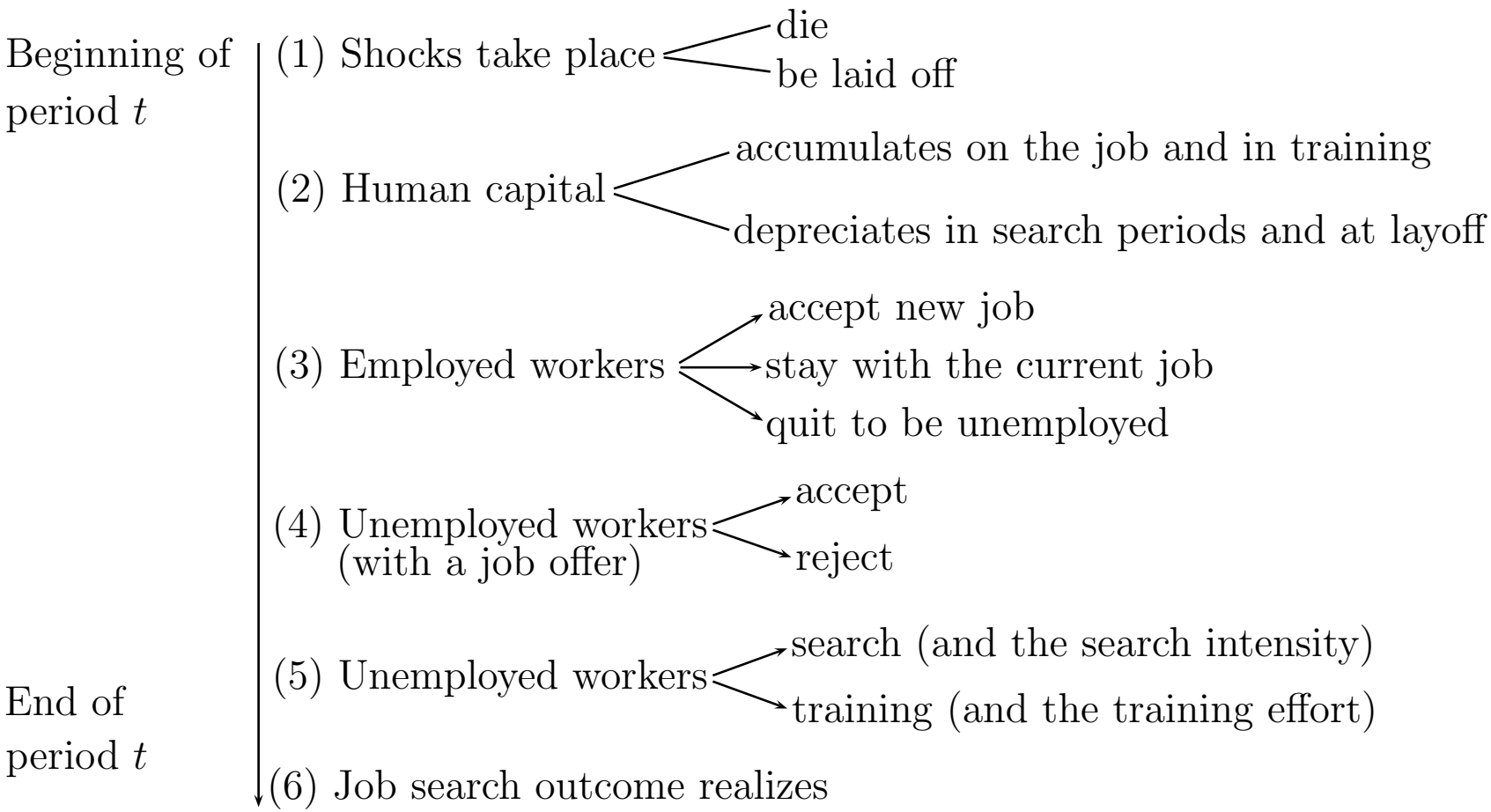
- Workers' human capital changes with their labor market experiences.
- Workers are risk neutral, their earnings (I) are determined by $I = wh$
  - h: human capital level
  - w: wage rate per unit of human capital.
- Workers decisions on job search or training participation affect the benefits they receive.

Timing of the Model



Unemployed Workers with Unemployment Benefits

$$V_b(h,I) \quad = \quad \max_{\{\text{search, training}\}} \{V_b^S(h,I), V_b^{Tr}(h,I)\} \qquad b \in \{UI, UA\}$$

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where

$$V_b^S(h,I) = \max_s \Big\{ \overbrace{-c(s) + \eta_b^S \cdot I}^{current\ value}$$
$$+(1-\alpha)\beta \textstyle\sum_{h'} \mu^S(h,h') \Big[[1-\pi(s)] U_b^S(h',I)$$
$$+\pi(s) \big(\textstyle\int_{wh' < \kappa \tilde{I}} \max\{V^e(h',w), U_b^S(h',I)\} dF(w)$$
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Search: $V_b^S(h,I)$

- Benefits generosity $\boldsymbol{\eta_b^S}$
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- Human capital transition $\boldsymbol{\mu^S(h,h')}$
- Job finding rate $\boldsymbol{\pi(s)}$

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Trade-offs between Search and Training:

- Actively searching for jobs lead to higher job finding rates in the short term; but human capital may depreciate during unemployed period.

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Trade-offs between Search and Training:

- Actively searching for jobs lead to higher job finding rates in the short term; but human capital may depreciate during unemployed period.
- Attending training programs may get human capital improved; but the job finding rates may be lower in the short term.

Government's Budget Constraint

$$\overbrace{\int (\phi + \eta_{ui} I) d\Lambda_{ui}^{Tr}(h, I) + \int (\phi + \eta_{ua}^{Tr} I) d\Lambda_{ua}^{Tr}(h, I)}^{costs\ of\ training\ programs}$$

$$+ \underbrace{\int \eta_{ui} I d\Lambda_{ui}^{S}(h, I) + \int \eta_{ua}^{S} I d\Lambda_{ua}^{S}(h, I) + \int SA d\Lambda_{sa}(h)}_{costs\ of\ UI\ and\ SA} = \underbrace{\int \tau w h d\Lambda^{e}(w, h)}_{tax\ revenue}$$

Equilibrium

A *stationary equilibrium* consists of a set of government policy rules $\{\tau, \tau_0, \kappa, \eta_b^i, \delta_b^i, SA\}$ $(b = UI, UA;\ i = S, Tr)$, workers' decision rules on search, training and wage offer acceptance (at different labor market status), and time-invariant distribution, such that

- given government's policies, workers' decision rules solve workers' problems
- the associated time-invariant distribution is consistent with workers' optimal decisions
- government balances its budget constraint every period, which means tax revenue covers the total expenditures on benefits and training costs

Parameters, Calibration and Estimation

Group 1: Parameters values by calibration

Table 1: Calibrated Values of Model Parameters

Paramter	*Notation*	*Value*	*Source and Moments to Match*
probability workers die every period	α	0.0021	43 years of working life
discount factor	β	0.9967	annual risk-free interest rate of 4.02%[a]
suitable earning level ($e(I) = \kappa \cdot I$)	κ	0.7	OECD (2003)
UI replacement ratio	η_{ui}	0.60	OECD (2003)
UA replacement ratio (search period)	η_{ua}^{s}	0.53	OECD (2003)
UA replacement ratio (training period)	η_{ua}^{Tr}	0.575	OECD (2003)
UI expiration rate every search period	δ_{ui}^{s}	0.052	maximum UI entitlement duration of 19.3 months in search periods (Wunsch, 2005)
UI expiration rate every training period	δ_{ui}^{Tr}	0.023	maximum UI entitlement duration of 43 months in training periods (Wunsch, 2005)
UA expiration rate every period	δ^{ua}	0.0025	decreases by 3% per year OECD (2003)
monthly training cost per participant[b]	ϕ	0.59	IZA Research Report (2005)
income tax rate (the fixed part)	τ_0	0.35	the total tax rate ($\tau + \tau_0$) is about 40%

[a] This is the average value of the term structure of interest rates on listed Federal securities residual maturity of 1 years between 2000 and 2002. (Data source: Bundesbank, Germany, 2008).

[b] This is the direct training cost besides the unemployment compensation paid to the participants.

Parameters, Calibration and Estimation

Group 2: Parameters values by estimation

Paramters on human capital transitions	
skill depreciation rate during searching periods	μ^u
skill accumulation rate at *high* training effort	μ^{th}
skill accumulation rate at *low* training effort	μ^{tl}
skill accumulation rate on the job	μ^e
probability of transiting from high skill to low skill at laid-off time	μ^l
Disutility (per model period) for search and training activities	
search disutility function ($c(s) = A\frac{(1-s)^\gamma - 1}{\gamma}$)	A
	γ
disutility for low training effort	$d(t^L)$
disutility for high training effort	$d(t^H)$
Job arriving rates conditional on different activities	
in search period ($\pi(s) = Bs^\xi$)	B
	ξ
in training programs	π^T
on the job	π^J
Other parameters	
laid-off probability for low skill	$\lambda(L)$
laid-off probability for high skill	$\lambda(H)$
mean of wage distribution	μ_w
standard deviation of wage offer distribution	δ_w

About the Data Used in This Paper

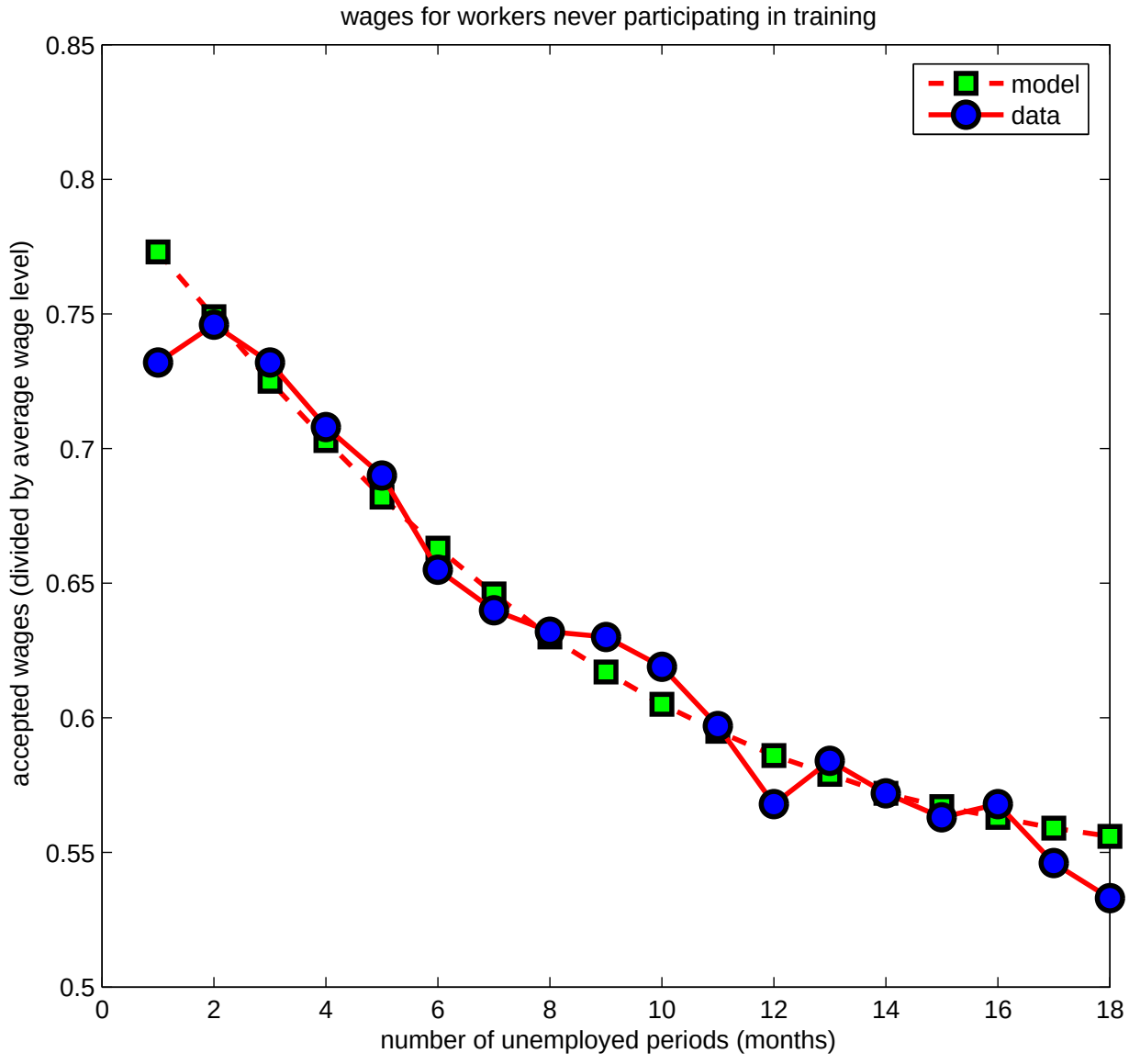
Integrated Employment Biographies Sample (IEBS)which is a 2.2% random sample of population.

- The IAB **employment history** (BeH) which contains 12,594,862 spells between 1990 and 2003
- The IAB **benefit recipient** history (LeH) which contains 2,388,627 spells between 1990 and 2004
- The **participants-in-measures** data (MTG) which contains 238,232 spells between 2000 and 2004
- Data on **job search** originating from the applicants pool database (BewA) which contains 1,828,266 spells between 2000 and 2004

Model Fit

Moments	*Model*	*Data*
Distribution		
employment rate	0.8627	0.8640
proportion of people who search	0.1243	0.1222
proportion of people who take training	0.0130	0.0141
proportion of people entitled with UI	0.0591	0.0586
proportion of people entitled with UA	0.0273	0.0274
proportion of people entitled with SA	0.0509	0.0503
Transitions		
from employment to unemployment	0.0091	0.0104
from search to employment	0.0642	0.0622
from search to training	0.0103	0.0206
from training to employment	0.0418	0.0464
from training to search	0.1073	0.1175
Other wages statistics		
wage growth rate on the job	0.0062	0.0078
coefficient of variation	0.5140	0.4568
average previous wages	0.8417	0.7200
average wages conditional on (previous) benefit entitlement and activities		
Search + UI	0.7080	0.7430
Training + UI	0.6187	0.7097
Search + UA	0.6886	0.5784
Training + UA	0.5982	0.5909

Model Fit


wages for workers never participating in training
model
data
accepted wages (divided by average wage level)
number of unemployed periods (months)
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0
2
4
6
8
10
12
14
16
18

Quantitative Results

Policy Reforms and Counterfactual Experiments

Table: Comparison of the Steady States of Different Economies

	Benchmark (2000-02)	*Reform 1 (2003)*	*Reform 2 (2005)*	*Reform 3 (2006)*	*Training U.S.*	*No Training U.S.*
percent of						
Unemp.	12.6					
Employ.	86.3					
percent of						
Training	1.3					
Searching	12.4					
UI	5.9					
UA	5.1					
SA	2.7					
Output	100.0					
Tax (%)	5.4					

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Unemp.	12.6	13.2	13.5			
Employ.	86.3	86.1	86.1			
percent of						
Training	1.3	0.8	0.4			
Searching	12.4	13.0	13.5			
UI	5.9	6.1	6.0			
UA	5.1	5.1	5.2			
SA	2.7	2.7	2.7			
Output	100.0	99.0	98.3			
Tax (%)	5.4	5.3	5.2			

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Employ.	86.3	86.1	86.1	86.6		
percent of						
Training	1.3	0.8	0.4	2.4		
Searching	12.4	13.0	13.5	11.0		
UI	5.9	6.1	6.0	4.6		
UA	5.1	5.1	5.2	5.9		
SA	2.7	2.7	2.7	2.9		
Output	100.0	99.0	98.3	102.4		
Tax (%)	5.4	5.3	5.2	5.6		

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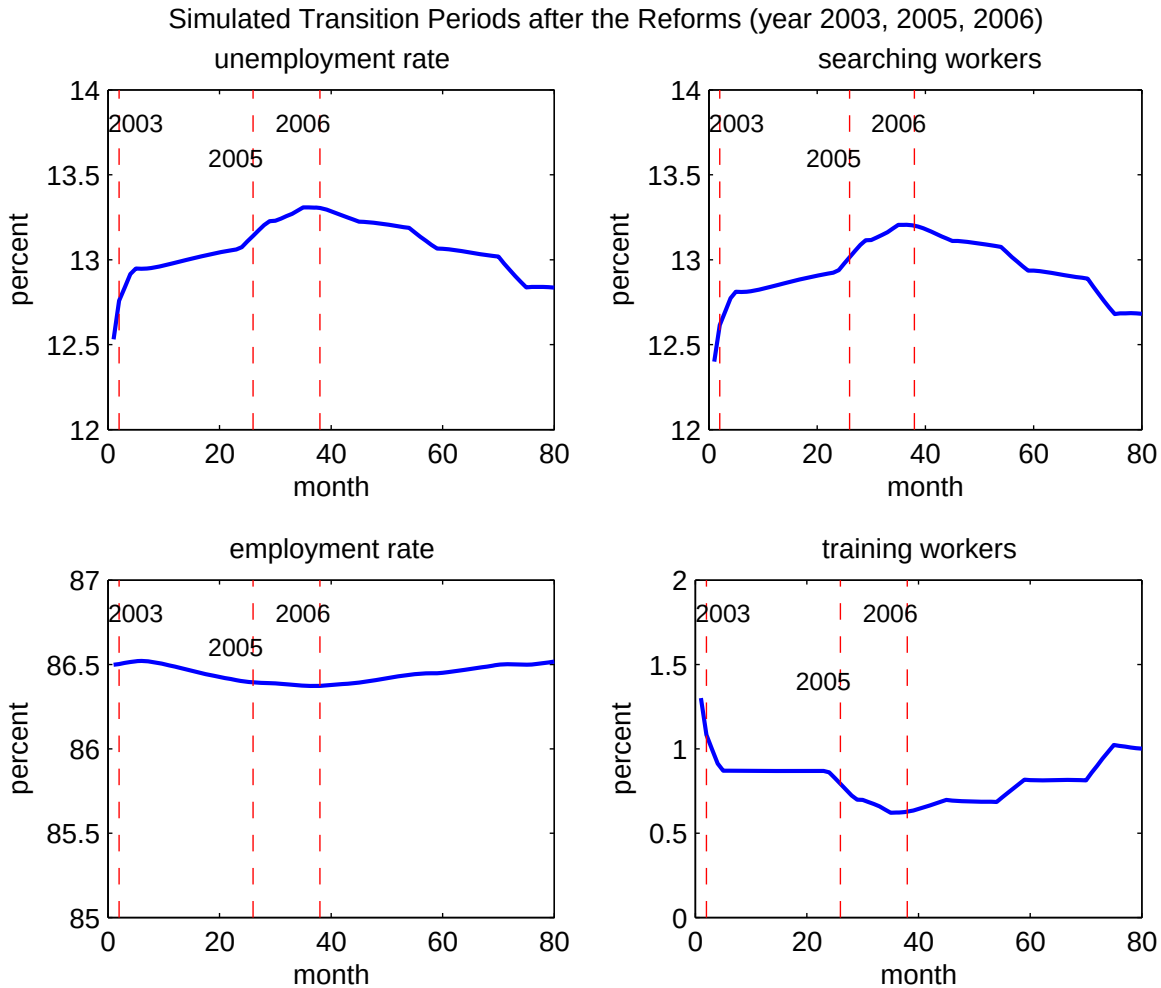
Unemp.	12.6	13.2	13.5	11.3	5.3	
Employ.	86.3	86.1	86.1	86.6	91.2	
percent of						
Training	1.3	0.8	0.4	2.4	3.7	
Searching	12.4	13.0	13.5	11.0	5.1	
UI	5.9	6.1	6.0	4.6	2.7	
UA	5.1	5.1	5.2	5.9	0.0	
SA	2.7	2.7	2.7	2.9	6.1	
Output	100.0	99.0	98.3	102.4	109.9	
Tax (%)	5.4	5.3	5.2	5.6	2.7	

Policy Reforms and Counterfactual Experiments

Table: Comparison of the Steady States of Different Economies

	Benchmark (2000-02)	*Reform 1 (2003)*	*Reform 2 (2005)*	*Reform 3 (2006)*	*Training U.S.*	*No Training U.S.*
percent of						
Unemp.	12.6	13.2	13.5	11.3	5.3	8.9
Employ.	86.3	86.1	86.1	86.6	91.2	91.1
percent of						
Training	1.3	0.8	0.4	2.4	3.7	0.0
Searching	12.4	13.0	13.5	11.0	5.1	8.9
UI	5.9	6.1	6.0	4.6	2.7	2.9
UA	5.1	5.1	5.2	5.9	0.0	0.0
SA	2.7	2.7	2.7	2.9	6.1	6.0
Output	100.0	99.0	98.3	102.4	109.9	103.0
Tax (%)	5.4	5.3	5.2	5.6	2.7	1.5

Simulated Transition Paths



Related Literature and Contribution

- Provide a positive analysis on several recent German labor-market reforms on training programs and unemployment benefits.
  - Normative studies on unemployment insurance programs and training programs
    - Pavoni (2004), Pavoni and Violante (RES 2007)
  - Empirical work to estimate the training effect on individual employment probability and wage earnings.
    - Panneberg and Helberger (1997), Fitzenberger and Prey (1999), Hujer, Manurer and Wellner (1999), Klose and Bender (2000), Bergemann, Fitzenberger and Speckesser (2004), Hujer, Thomsen and Zeiss (2004), Speckesser (2004), Lechner, Miquel and Wunsch (2004), Lechner and Melly (2007), Fitzenberger, Osikominu and Völter (2007)

Conclusions and Current Work

Conclusions:

- Develop a structural model to study both training programs and unemployment insurance programs.
- Use the micro data in Germany to estimate the structural model and use it to evaluate several recent reforms.

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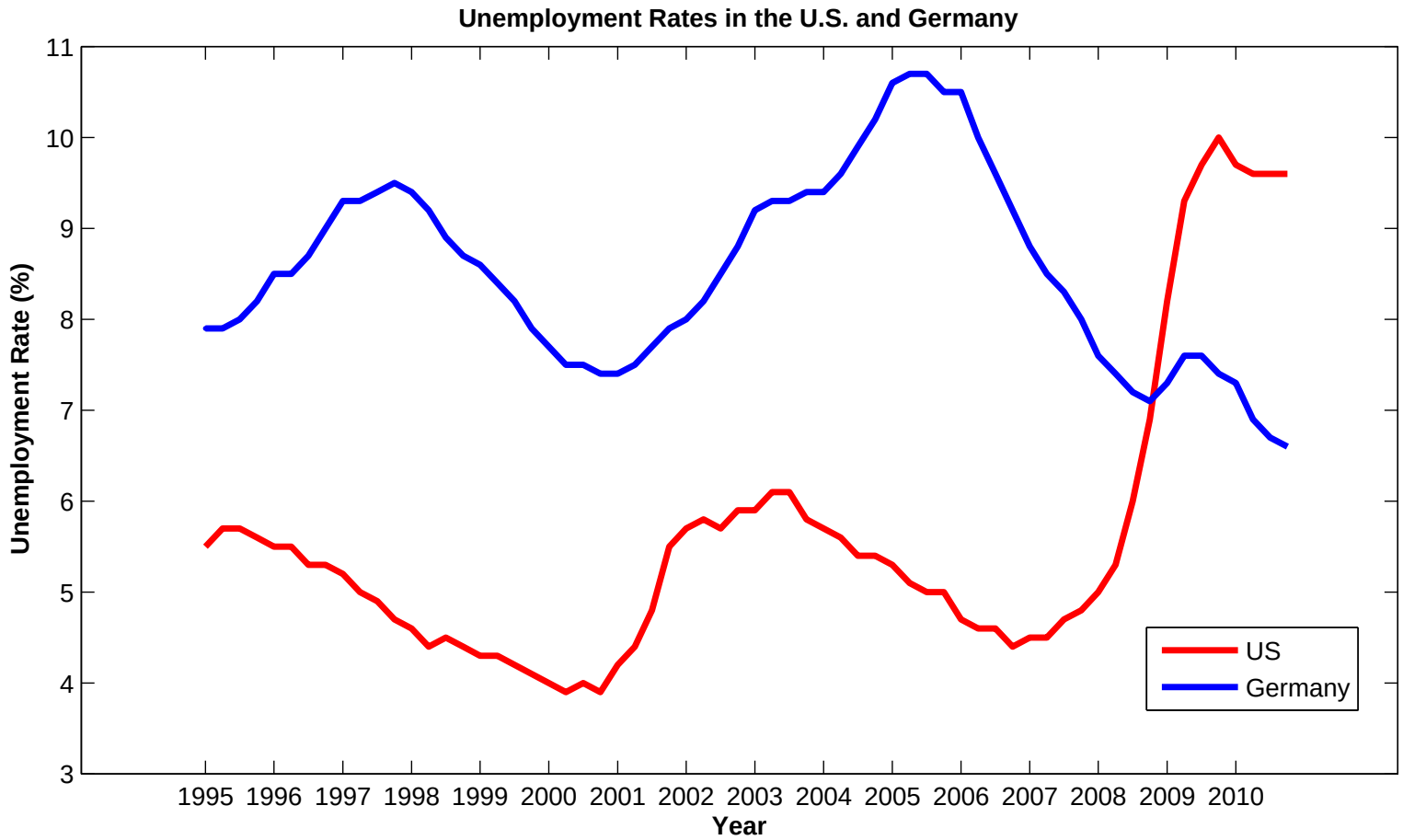
Current work: What accounts for the current high and persistent unemployment rate in the U.S.?

- A Standard Matching Model + Human Capital + Financial Shocks
- Explore both the effects from the demand side and that from the supply side.
  - Demand: Financial Shock and Technology Shock
  - Supply: Extended UI
- Utilize counterfactuals to separate the effects of different factors.

Unemployment Rates in the U.S. and Germany



Appendix: Unemployed Workers without Unemployment Benefits

$$V_{sa}(h) = \max\{V_{sa}^{S}(h),\ V_{sa}^{Tr}(h)\}$$

where

$$\begin{aligned}
V_{sa}^{S}(h) &= \max_{s}\Big\{-c(s) + SA \\
&\quad +(1-\alpha)\beta\sum_{h'}\mu^{u}(h,h')\Big[[1-\pi(s)]V_{sa}(h') \\
&\quad +\pi(s)\int \max\{V^{e}(h',w),V_{sa}(h')\}dF(w)\Big]\Big\} \\
V_{sa}^{Tr}(h) &= \max_{t}\Big\{-d(t) + SA \\
&\quad +(1-\alpha)\beta\sum_{h'}\mu^{Tr}(t,h,h')\Big[[1-\pi^{Tr}]V_{sa}(h') \\
&\quad +\pi^{Tr}\int \max\{V^{e}(h',w),V_{sa}(h')\}dF(w)\Big]\Big\}
\end{aligned}$$

Appendix: Employed Workers' Problem

$$
\begin{aligned}
V^e(w,h) \quad = \quad & I + (1-\alpha)\beta\Big\{(1-\lambda(h))\sum_{h'}\mu^e(h,h') \\
& \cdot\big[\pi^J\int V(h',w',w)F(w') + (1-\pi^J)V(h',w,w)\big] \\
& +\lambda(h)\sum_{h'}\mu^l(h,h')V_{ui}(h',I)\Big\}
\end{aligned}
$$

where

$$
V(h',w',w) \quad = \quad \max\{V^e(w,h'), V^e(w',h'), V_{sa}(h')\}
$$