

# What Drives Wage Effects of Unemployment Benefits? Evidence from Natural Experiments

Patrick Arni, University of Bristol and IZA

*Preliminary*

6th AMSE-BdF Labor Market Conference

Banque de France, Paris, November 30

# How Generous Should Unemployment Insurance Be?

Policy debate: pros and cons

- substantial expenses on unemployment insurance (UI)
- insure against job losses: due to business cycles, structural changes,...
- also: means of economic and social policy to absorb shocks

⇒ (How) Do the individuals benefit?

Causal wage effects of UI

- ⇒ measure of individual “welfare” (i.e. income) impacts of staying unemployed
- ⇒ ... income can be in the objective function of policy makers
- ⇒ trade-off of different effects on individual income

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# Wage Effects of UI: Countervailing Forces

How does potential benefit duration (PBD) affect the individual?

↪ Countervailing forces!

$$\text{UI wage effect} = \underbrace{\text{selectivity effect}}_{\substack{\text{positive force} \\ \leftrightarrow \text{reservation wage}}} + \underbrace{\text{duration (dependence) effect}}_{\text{negative force}}$$

Theory: PBD  $\uparrow \Rightarrow$  reservation wage  $\uparrow$

①  $w \uparrow$

② UE duration  $\uparrow \Rightarrow F(w) \downarrow \Rightarrow w \downarrow$

What is the relative importance of the effects?

$\Rightarrow$  different policy interpretations

Which behaviors are behind the UI benefits effects?

$\Rightarrow$  crucially shape policy conclusions

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# Debate in Literature

## Different empirical results on UI wage effects

### Not different from zero

- Card et al. (2007) [-], Lalive (2007) [-], Van Ours and Vodopivec (2008), Centeno and Novo, (2009) [+]

### Negative

- Schmieder et al. (2015)

### Positive

- Nekoei and Weber (2015)

### Surveyed reservation wages, e.g.

- Feldstein and Poterba (1984)
- Krueger and Mueller (2014); Addison, Centeno and Novo (2008); Arni (2015)

### Reservation wages and register data

- Le Barbanchon et al. (2016, ongoing)

### Structural approach: indirect estimation of reservation wage effects

- e.g. Van den Berg (1990)

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## This Paper (up to now)

- Estimation of reservation wage effects **and** earnings effects **and** duration effects within the same natural experiments
- Are there reservation wage effects?
- Relative importance of impacts?
- Heterogeneity of effects by age
- Drivers of heterogeneity of reservation wage effects

### Road map:

- 1 reservation wage effects (by age)
  - properties of surveyed reservation wages
- 2 comparison all outcomes  $\rightsquigarrow$  elasticities
- 3 analysis of heterogeneity

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# The Natural Experiments: PBD Changes at Thresholds

The quasi-experiments on potential benefit durations

- contribution threshold
- ↔ Diff-in-Diff or RD around thresholds (adding trends)
- eligibility threshold
- ↔ Diff-in-Diff around threshold (adding trends)
- ...plus conditions on contribution and family composition

# Swiss Unemployment Insurance

## Income support:

- potential benefit duration (PBD): normally 400 days
- replacement rate (RR): 70 or 80 % (family situation, income ceiling)
- median unemployment duration 4 to 6 months, ue rate 3-4%
- average daily benefit: 130-140 CHF [1 CHF = 1.10 USD = 0.959 EUR]
- social assistance for the non-eligible (means-tested, ~68% of UB)
- regular caseworker meetings, intense monitoring
- ALMPs



# The Natural Experiments: PBD Changes at Thresholds

Quasi-experiment on contribution threshold, around 18 months:

<i>months of UI contribution</i>	<i>(for age 25-55) benefit days</i>
< 18	260
18 – 24	400

frame for UI contributions: 24 mt

Quasi-experiment on potential benefit durations (working days), age 25:

	<i>w/o children</i>	<i>with children</i>
< 25	200	400
≥ 25	400	400

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# Data & Sampling

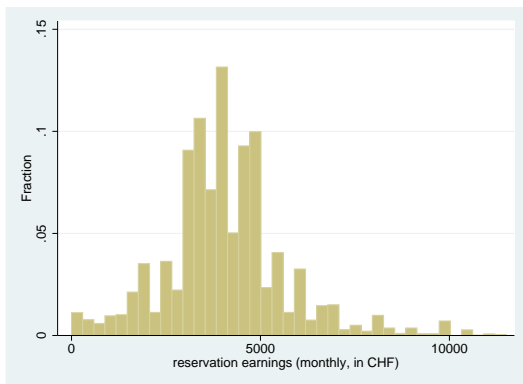
## Register data

- full coverage of Switzerland, daily precision
- Rich set of socio-demographic and benefit-related covariates
- Linked data: UI register and social security register → earnings and employment
- Inflow period: september 2012 to march 2014
- Sampling: basic eligibility for UI; min. first meeting (after 3 weeks, median) // positive earnings before UI entry

## Reservation earnings: surveyed

- linked to register data
- collected in the context of an experimental test of a profiling system
- reservation earnings (monthly gross earnings) were recorded by the caseworker in the first meeting with the job seeker
- high response rates (0.8-0.95)
- collected in canton of Fribourg: well representative for Switzerland

# Reservation Earnings: Graphical Evidence

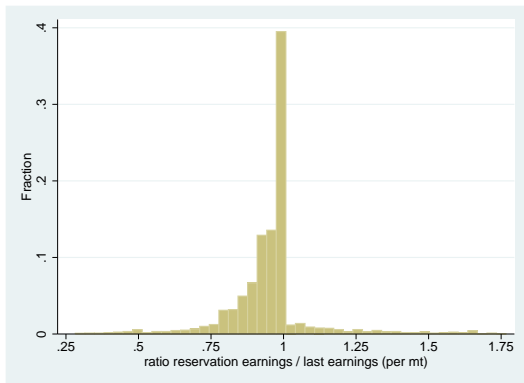


In total N=8886 obs with surveyed reservation earnings (up to age 61.5).

Mean 4120 (s.d. 1744), median 4000 CHF.

[1 CHF = 0.84 EUR = 0.786 GBP]

# Reservation Earnings: Empirical Properties



Ratio reservation earnings / earnings last job: mean 1.04, median 0.98.

↪ very close to Feldstein & Poterba (1984) and Krueger & Mueller (2014)

# Reservation Earnings: Empirical Properties

## 1 Correlation to UE exit: indicative regressions

	(1) Cox <i>50 days</i>	(2) Cox <i>180 days</i>	(3) Cox <i>50 days</i>	(4) Cox <i>180 days</i>
<i>UE exit within</i>				
res. earnings	-0.0165 (0.0428)	-0.0022 (0.0149)	-1.249* (0.724)	-0.202* (0.121)
ratio $w^r/w^p$	0.139 (0.360)	0.211* (0.124)	-6.999** (3.206)	-1.082 (0.761)
<i>indiv. FE</i>			yes	yes
observations	7,049	7,049	865	865

Note: reservation earnings in 1000 CHF; ratio trimmed at top (1.5); X variables incl.

## 2 How can empirical reservation wage be explained?

- reservation earnings are meaningfully correlated to observables
  - correlations to age, gender, education, experience
- past (insured) earnings is a very strong predictor: delivers  $R^2 = 0.60$

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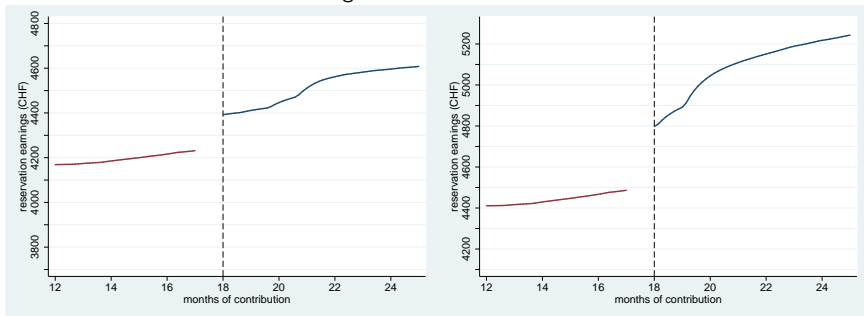
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## Reservation Earnings: Contribution Threshold, Ages 28–50

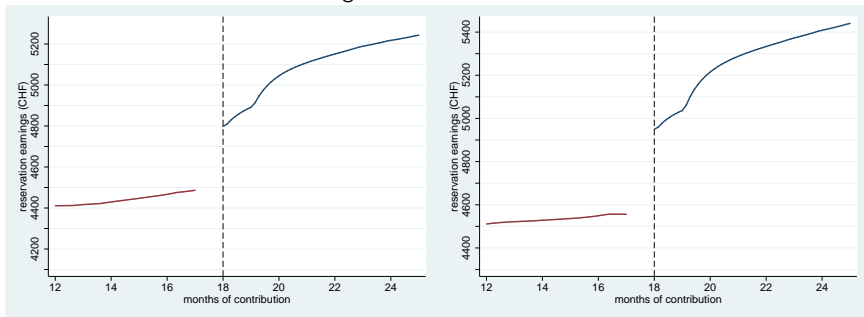
reservation earnings by RD groups, polynomial smoother, full sample  
ages 28–35 and 35–50





## Reservation Earnings: Contribution Threshold, Ages 35–54

reservation earnings by RD groups, polynomial smoother, full sample  
ages 35–50 and 50–54



# Empirical Specifications

RD: contribution 18 mt threshold

$$y_i = \alpha + x_i' \beta + \delta D_i^{RD} + \pi' f(\text{cmt}_i^{\text{pre,post}}) + \eta_t + \mu_r + \varepsilon_i \quad (1)$$

whereby

- $D^{RD}$  is indicator for full eligibility (400 days PBD)
- $x$  socio-demographic and benefit-related covariates
- $\eta_t$  calendar time dummies (month, year),  $\mu_r$  regional dummies (PES, cantons)

Specification trend forcing variable

- linear
- step function (per mt of contribution)

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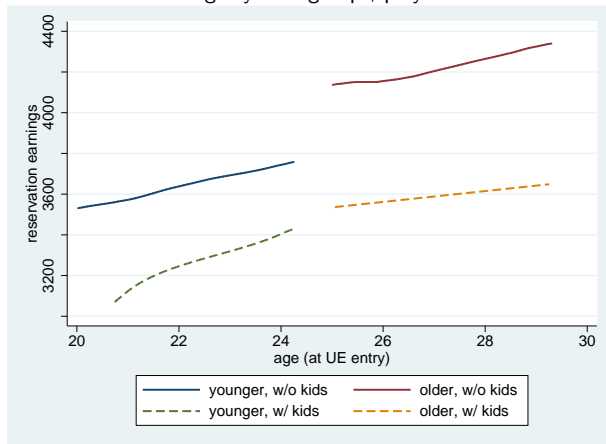
## Effects on Reservation Wages: Contribution Threshold

	(1)	(2)	(3)
age	29-35	35-45	45-54
outcome	<i>reservation earnings (CHF, monthly)</i>		
threshold effect	161.6** (63.42)	193.1** (64.11)	253.3* (118.9)
$\Delta$ PBD (in days)	140	140	140
per month of dP	0.59%	0.66%	0.82%
elasticity	0.11	0.12	0.15
covariates	yes	yes	yes
age trend	1 step	1 step	1 step
outcome mean	4242	4527	4808
observations	1,192	1,537	1,125
$R^2$	0.454	0.519	0.581

Cluster robust standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; 1 CHF=0.79 GBP=0.96 USD=0.84 EUR

## Reservation Earnings: Age Threshold 25

reservation earnings by DID groups, polynomial smoother



# Empirical Specifications

Diff-in-Diff: age 25 threshold

$$y_i = \alpha + x_i' \beta + \gamma^1 I_i^{post} + \gamma^2 I_i^{treat} + \delta D_i^{DID} + \eta_t + \mu_r + \varepsilon_i$$

whereby

- $x$  socio-demographic and benefit-related covariates
- $\eta_t$  calendar time dummies (month, year),  $\mu_r$  regional dummies (PES, cantons)

Test for age trends (if sign.)

- flexible linear RD trends
- step function (per year of age)

# Empirical Specifications

Diff-in-Diff: age 25 threshold

$$y_i = \alpha + x_i' \beta + \gamma^1 I_i^{post} + \gamma^2 I_i^{treat} + \delta D_i^{DID} \\ + \pi' f(\text{age}_i^{pre, post, c, t}) + \eta_t + \mu_r + \varepsilon_i$$

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Test for age trends (if sign.)

- flexible linear RD trends
- step function (per year of age)

## Results: Effects on Reservation Wages: Age Threshold 25

	(1)	(2)	(3)
<i>outcome</i>	4y win	4y win	6y win
	<i>reservation earnings (CHF, monthly)</i>		
threshold effect	279.1*** (61.94)	219.6** (75.97)	<b>218.5**</b> (88.64)
$\Delta$ PBD (in days)	200	200	200
per month of dP	0.79%	0.62%	<b>0.61%</b>
elasticity	0.15	0.11	<b>0.11</b>
covariates	yes	yes	yes
age trend	no	step	step
outcome mean	3832	3832	3876
observations	1,067	1,067	1,612
$R^2$	0.393	0.398	0.417

Cluster robust standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ ,  
\*  $p < 0.1$ ; 1 CHF=0.79 GBP=0.96 USD=0.84 EUR

$$\text{PBD effect elasticity: } \eta_{PBD} = \frac{\frac{dy}{y}}{\frac{dP}{P}}$$



# Considered Labor Market Outcomes

## Non-employment duration

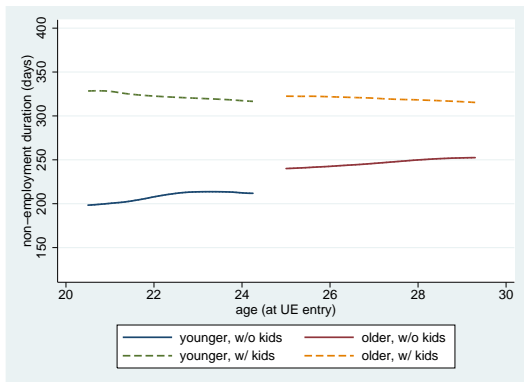
- duration from registration at the UI until take-up of job, as measured by positive social security earnings
- (different from entry/exit into/from UI)

## Earnings- and employment path after unemployment

- 1 total generated earnings per month, sum over first six months after unemployment exit
- 2 decompose into...
  - 1 earnings while employed (=positive earnings), sum over first six months after UE
  - 2 probability (or proportion) of being employed over the first six months after UE

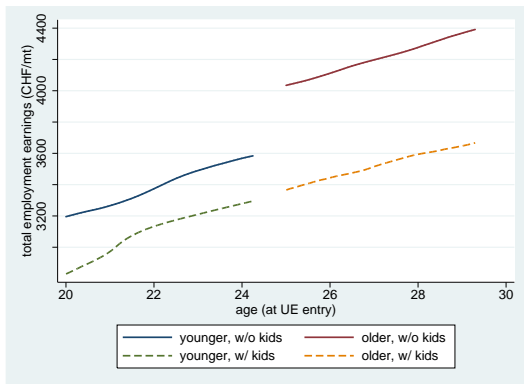
# Non-Employment Duration, Age Threshold 25

non-employment duration in days, full sample



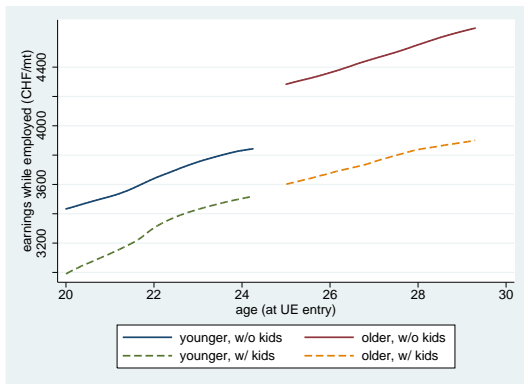
# Total Earnings, Age Threshold 25

total employment earnings per mt, avg 6 mt post-ue, full sample



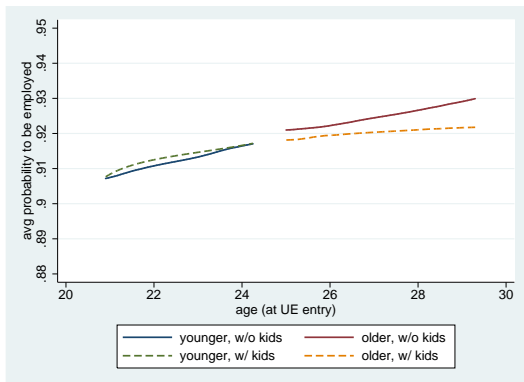
# Earnings while Employed, Age Threshold 25

earnings while employed, per mt, avg 6 mt post-ue, full sample



# Employment Stability, Age Threshold 25

probability to be employed, avg 6 mt post-ue, full sample



## Effects on Earnings &amp; Durations: Age Threshold 25

	(1)	(2)	(3)	(4)	(6)
	DiD	DiD	DiD	DiD	DiD
<i>outcome</i>	<i>income</i>	<i>wage</i>	<i>empl.</i>	<i>duration</i>	<i>dur: Cox</i>
threshold effect	159.5*** (60.91)	130.2** (55.33)	0.0002 -0.0083	30.79*** (6.479)	0.193*** (0.0332)
$\Delta$ PBD (in days)	200	200	200	200	200
per month of dP	0.46%	0.35%	0.00%	1.84%	
<i>elasticity</i>	<b>0.08</b>	<b>0.06</b>	<b>0.00</b>	<b>0.34</b>	
covariates	yes	yes	yes	yes	yes
outcome mean	3773	4040	0.916	182	
observations	24,544	24,544	24,544	31,803	31,803
$R^2$	0.237	0.280	0.030	0.152	

Robust standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; 1 CHF=0.96 USD=0.84 EUR

## Effects on Earnings &amp; Durations: Contribution Threshold

<i>outcome</i>	(1) RD <i>income</i>	(2) RD <i>wage</i>	(3) RD <i>empl.</i>	(4) RD <i>duration</i>	(6) RD <i>dur: Cox</i>	Obs
<b>age 28-35</b>	172.4*** (54.77)	165.1*** (51.27)	0.0047 (0.00581)	10.53*** (1.951)	-0.0568*** (0.0109)	41,687 59,193
per month of dP	0.71%	0.56%	0.08%	0.76%		
<b>age 35-45</b>	249.2*** (57.10)	208.8*** (51.75)	0.0135** (0.0060)	10.45*** (1.951)	-0.0466*** (0.0112)	44,143 65,541
per month of dP	0.82%	0.65%	0.23%	0.65%		
<b>age 45-54</b>	64.75 (64.78)	82.49 (58.78)	0.0025 -0.0069	14.99*** (2.355)	-0.0669*** (0.0137)	31,922 49,475
per month of dP	0.21%	0.25%	0.04%	0.86%		
covariates	yes	yes	yes	yes	yes	
trend	step	step	step	step	step	

Robust standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; 1 CHF=0.96 USD=0.84 EUR

# Comparison: Elasticities w.r.t. Benefit Changes ( $P$ )

<i>outcome age group</i>	<i>reservation earnings</i>	<i>income</i>	<i>earnings wage</i>	<i>employment</i>	<i>non-employment duration</i>
around age 25	<b>0.11</b>	0.08	<b>0.06</b>	0.00	<b>0.34</b>
age 28-35	<b>0.11</b>	0.13	<b>0.10</b>	0.01	<b>0.14</b>
age 35-45	<b>0.12</b>	0.15	<b>0.12</b>	0.04	<b>0.12</b>
age 45-54	<b>0.15</b>	0.04	<b>0.05</b>	0.01	<b>0.16</b>

- elasticities: percentage change in outcome, as a ratio of percentage change in potential benefit duration  $P$ :  $\eta_{PBD} = \frac{\frac{dy}{y}}{\frac{dP}{P}}$



## Effects on Expected Earnings

<i>outcome</i>	reservation earnings	expected earnings	realized earnings	<i>predictions, based on... rw effect realized earnings</i>	<i>w effect reservation earnings</i>
around age 25	0.11	<b>0.10</b>	0.06	<i>0.08</i>	<i>0.08</i>
age 28-35	0.11	<b>0.08</b>	0.10	<i>0.07</i>	<i>0.16</i>
age 35-45	0.12	<b>0.12</b>	0.12	<i>0.08</i>	<i>0.18</i>
age 45-54	0.15	<b>0.14</b>	0.05	<i>0.10</i>	<i>0.08</i>

# Are Reservation Wage Reactions too High/Low?

## *Simulation, by age group*

- approximate lognormal distribution of wage offers (by information on last wages)
- calculate realized wage effect ( $E[w|w > \phi]$ ), given reservation wage effect
- calculate reservation wage effect, given realized wage effect
- compare predictions to realized effects

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age 45-54	0.15	<b>0.14</b>	0.05	<i>0.10</i>	<i>0.08</i>

## Reservation Wage Path over (Earlier) Spell

Second observation of reservation earnings 2-3 months after initial meeting

<i>FE regression</i>	<i>reservation earnings (CHF)</i>
weeks in UI, up to age 28	0.671 (3.415)
weeks in UI, age 28-35	-2.264 (5.257)
weeks in UI, age 28-35	-3.166 (4.856)
weeks in UI, age 28-35	-4.428 (5.152)
Constant	4,136*** (15.72)
Observations	10,225

Robust standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; 1 CHF=0.96 USD=0.84 EUR

# Heterogeneity by Past UE Experience

Past unemployment duration (in previous 3 years)

	Res'wage	Wage	UE duration
baseline: 0 past ue dur	295.3*** (74.10)	140.5*** (32.62)	16.04*** (3.098)
past ue dur, 1st quintile	1.198 (132.8)	7.773 (32.94)	-10.90*** (3.242)
past ue dur, 2nd quintile	-400.7*** (132.0)	58.42* (30.65)	-12.70*** (3.040)
past ue dur, 3rd quintile	-225.4** (109.5)	64.33** (29.76)	-14.10*** (2.943)
past ue dur, 4th quintile	-447.1*** (111.9)	-30.83 (30.82)	-16.49*** (3.007)
Control Variables	Yes	Yes	Yes
Observations	4,894	141,433	206,230
R-squared	0.487	0.495	0.157

# Heterogeneity by Occupation

## Occupation groups (last job)

	Res'wage	Wage	UE duration
baseline: blue collar jobs	240.6*** (63.25)	219.5*** (33.71)	10.65*** (3.455)
white collar	505.4* (233.4)	73.96 (58.43)	1.584 (4.399)
technicians, engineers	130.6 (122.9)	64.34 (79.58)	-26.34*** (6.383)
construction	-98.38 (82.94)	-86.36*** (28.19)	-11.33*** (3.061)
sales (incl tourism)	-31.55 (125.6)	-15.01 (38.72)	-4.133 (3.829)
low-sk. service (gastronomy, cleaning)	-211.4* (88.66)	-172.5*** (27.22)	10.34*** (3.116)
administration	-339.3 (221.1)	94.07* (50.94)	-27.96*** (4.326)
health & social	-475.7* (216.2)	-32.47 (59.78)	-20.38*** (5.553)
Control Variables	Yes	Yes	Yes
Observations	4,879	141,398	206,178
R-squared	0.450	0.490	0.155

## Conclusion: Preliminary Insights

- Evidence for reservation wage effects
- Reservation wage/selectivity effects seem to matter quantitatively
- Decomposition of earnings effect of UI: both dimensions – duration and reservation wages – are economically relevant
  - ↪ trade-off decision for policy makers
- Age heterogeneity
  - ...in relative weight of reservation wage-, earnings- and duration effects
  - PBD effect on reservation wages increases (up to age 50)
- Drivers of reservation wage effects
  - Past unemployment experience
  - Skills, occupations, demand (offers)
  - Stringency/pressure of caseworker policy
  - (No impact of language region)

## Expectations and Reservation Wage Effects

- Expectations on  $E(\tilde{w})$  could affect reservation wage reaction
  - through direct effect of  $E(\tilde{w})$
  - through adaptation of willingness to compromise
- Construction of bias in wage expectations, based on survey item and register
- Bias of the form  $E(\tilde{w}) - E(\hat{w}|t_u)$
- Estimated/predicted based on neighboring cantons and non-participants in survey (register data)

Result: reservation wage effects by optimists/realists/pessimists

age	<i>pessimist effect relative to realist...</i>	<i>optimist</i>
28-35	++	+
35-45	--	-
45-54	++	-



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## Explanations Varying RW Effects: Demand Side

- In tendency, older job seekers earn more
- More variation in wages; potentially more influence

	<i>N</i>	<i>mean</i>	<i>s.d.</i>
25-30	18287	4018.9	1305.8
30-35	16519	4689.0	1714.5
35-40	13300	4928.1	2017.8
40-45	12036	5045.3	2137.3
45-50	11670	5228.7	2185.2
50-55	9094	5192.4	2134.0

# Determinants of Reservation Wage Effects?

Heterogeneity by past earnings (benefit level)

- 3 levels, split at p33 and p66
- low: significantly negative effect; mid: stat. zero (sign +);  
high: significantly positive effect

## Determinants of Reservation Wage Effects? 2

[noframenumbering]

Heterogeneity by education level

- 3 levels: compulsory / vocational / tertiary
- the higher the education level, the higher the r.w. effect

# Decomposing Effects of UI

According to Schmieder et al. (2015) formula

$$\frac{dE[w^e(t; P)]}{dP} = \left[ \frac{\partial w^e}{\partial \phi} \frac{\partial \phi}{\partial P} \right] + \left[ \frac{\partial w^e}{\partial \phi} \frac{\partial \phi}{\partial t} + \frac{\partial w^e}{\partial \mu} \frac{\partial \mu}{\partial t} \right] \frac{dD}{dP}$$

For young job seekers, in earnings (CHF) per month:

earnings effect	res'wage effect	$\frac{\partial w^e}{\partial \phi}$	$\frac{\partial \phi}{\partial P}$	duration effect	n-e on wage effect	$\frac{dD}{dP}$
14.13	18.30	0.772	23.71	-4.18	-37.87	0.110

- Calculation of  $\frac{\partial w^e}{\partial \phi}$ : reservation earnings are predicted into earnings sample; then regression of realized earnings on predicted  $\phi$  and covariates (per age group)
- $\frac{\partial \phi}{\partial t}$ : is set to zero, following Krueger et al. (2016)

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## Next Steps

- Decomposition of effects by job offer arrival rate versus job acceptance rate

$$\theta = \lambda[1 - F(\phi)]$$

- Model the joint distribution of  $t$  and  $w$  as (following Eckstein & Van den Berg 2007)

$$Pr(t, w) = g(t)f(w|w > \phi) = (1 - F(\phi))e^{-\lambda(1-F(\phi))t} \lambda \frac{f(w)}{(1 - F(\phi))}$$

- Assuming that  $\phi$  is result of optimization, we can plug in
- Express treatment effect as function of job offer arrival and job acceptance rate, respectively
- Direct link of reservation wage- and linked dataset

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