Biased Beliefs in Job Search: Structural Evaluation of Coaching and Counseling

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Preliminary. Comments welcome!

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Motivation

- Since Tversky and Kahneman (1974) broad evidence of prevalence of biased beliefs: People
  - *over-/under-predict* uncertain *positive/negative* events;
  - tend to overestimate their performance on difficult tasks (Moore and Healy, 2008).
- Job seekers *overestimate* job finding and offered wages
  (e.g. Spinnewijn (2015), JEEA & survey of Mueller and Spinnewijn (2023))
- Evidence of persistent biases
  (Mueller et al. (2021), AER; wage: Krueger and Mueller (2016), AEJ:EP and Caliendo et al. (2024), IZA)
- **Research Questions**:
  1. Does feedback on job search success affect beliefs = learning?
  2. How important are beliefs for search behavior & job outcomes?
  3. Can policy affect beliefs & does it matter for job outcomes?

What do we do?

1. We use unique data on search behavior, **expectations**, and job finding of Swiss older job seekers (Arni, 2015).
2. We exploit an RCT that finds positive effects on job finding of a program that combines intensified counseling with coaching to address biased beliefs.
3. Build & estimate a **structural job search model** to capture
   - whether & how job seekers learn from feedback (= arrival of job interviews);
   - how (updating of) beliefs affect(s) search behavior;
   - the decomposition of the program effects into its drivers = effects on search efficiency, job search costs, and beliefs.
4. We extend standard Bayesian learning, allowing it to be based on *perceived & fading* info instead of objective info: key to fit the observed time pattern of expectations!

Our contribution

- Extend Potter (2021) by
  - fitting *elicited* expected # job interviews $\leftrightarrow$ *estimating* initial biased expectation of # job offers and *assuming* Bayesian updating
  - allowing for quasi-Bayesian (Rabin, 2013) learning by basing it on perceptions & allowing for memory bias (Azereido Da Silveira et al., 2024, AER)
- $\neq$ Conlon et al. (2018) by:
  - focus on search & expected # interviews $\leftrightarrow$ wage offers & no search
  - *quasi*-Bayesian learning $\leftrightarrow$ non-Bayesian
- High frequency of belief elicitation ($6\times$ in UE spell) & method to account for missing info
- Study program effects on belief formation & its impact on behavior
- Method to decompose treatment effect of ALMP into drivers: beliefs, search costs & search efficiency.

Preview of findings (1): The role of beliefs

- **Non-monotonic pattern in job finding**:
  consistent with Potter (2021) $\leftrightarrow$ standard job search
- **Quasi-Bayesian learning (of perceptions)**
  $\Rightarrow$ **beliefs not persistent**:
  - rapid updating: initial belief matters little
  - $3\times$ more weight to recent positive info than Bayesian
  - rapidly forgetting good news
    $\Rightarrow$ overoptimism $\rightarrow$ over-pessimism
- **Beliefs drive acceptance behavior, not search effort**

Preview of findings (2): Program effects

Decomposition of program effects

- **Intensified counseling** $\Rightarrow$
  MC search $\downarrow \Rightarrow$ search, interviews & $w^R \uparrow \Rightarrow \Delta$ job finding $= 0$
- **Coaching** $\Rightarrow$
  (1) search efficiency $\uparrow \Rightarrow$
  interviews $\uparrow$ (Δ search $= 0$) & $w^R \uparrow \Rightarrow \Delta$ job finding $= 0$
  (2) Δ beliefs $\Rightarrow$ speeds-up memory loss + news (=interviews)
  $\Rightarrow$ speed $w^R \downarrow$ & job finding $\uparrow$.
- **Overall**, Δ*belief formation* drives + effect on job finding.

Outline

- Data & field experiment
- Job search model with biased beliefs
- Estimation results
- Simulations
- Conclusion

Data: sample & sources

- Inflow sample of unemployed job seekers aged 45-61 in 2 PES in Zurich agglomeration: Dec 2007 - Dec 2008.
- Data collected by Arni (2015) combining admin records of UI with repeated surveys of job seekers and caseworkers:
  - Admin records on
    - (i) daily **timing exit to employment**.
    - (ii) individual characteristics and **UI & wage** history.
  - Surveys in months 1/2/3/4/9/13 ($\Delta = 40$ days) & at exit on
    - (i) search behavior (# **of applications**, reservation wage) & search outcome (# **of interviews**);
    - (ii) subjective beliefs (**expected # of interviews**)
    - (iii) **accepted monthly wage** in exit survey (after 3 months)

Field experiment

- UI expire after 1.5/2 years (13/17 periods) if aged 45-54/ 55-61 & replacement rates 70-80% (max. 7,000 €/month). Subsequent welfare benefit = 70% of UI.
- **Control** (CG)
  - "Status quo" = counseling $\mathbf{1}\times$/month and **no** coaching.
- **Treatment** (TG)
  - (1) *Intensified* counseling ($\mathbf{2}\times$/month 4 months) $\Rightarrow$ search costs $\downarrow$
  - (2) *Coaching* ($\sim$ 60 days, 3 days/week, groups 10-15 pers.)

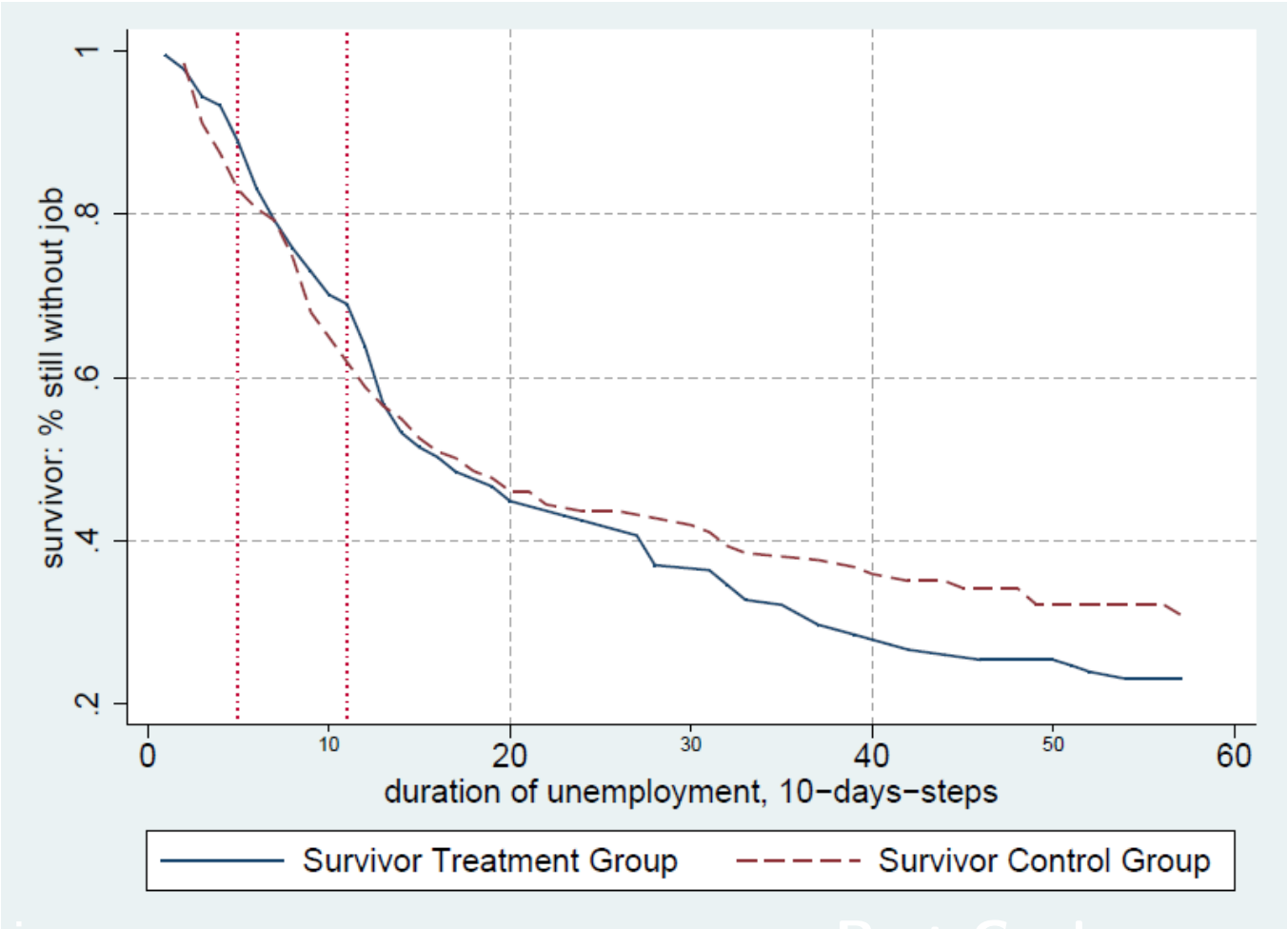
    Coaching starts after $\sim$ 50 days.

    Aims at improving job search skills ($\Rightarrow$ **search efficiency** $\uparrow$) & at influencing beliefs by making a realistic self-assessment, i.e. **more realistic** expectations about LT UE risk, job types, wages ($\Rightarrow$ **overconfidence** $\downarrow$).

Field experiment: balancing Table

	Treatment Gr.	**Control Group**	t-val
Gender: Woman	44.1%	43.3%	0.15
Married (or separated)	56.4%	49.7%	1.22
Age	52.5	51.9	1.04
Nationality: CH	84.4%	85.1%	-0.17
Qualification: (semi-)skilled	96.2%	95.7%	-0.17
Employability: 3/4	77.4% / 21.5%	78.0% / 21.3%	(-)0.05
At least 1 foreign language	55.4%	53.2%	0.39
Job $<$ 100%	17.7%	17.7%	0.00
PES 2	14.5%	10.6%	1.04
Duration to availability (days)	11	13	-0.49
Past UE duration (days)	0	0	0.00
Observations	186	141	
	56.9%	43.1%	

Field experiment: treatment effect on survival in unemployment



Data: Questions on job search behavior and beliefs

1. "How many **applications** did the JS send out in the last 4 weeks?" $= \hat{s}_t$
2. "How many **interviews** did the JS have in the last 4 weeks?" $=$ realized $\#$ interview invitations. $= \hat{\iota}_t$
3. "Based on the applications that I sent out in the last 4 weeks, I **think** I will be invited to the following number of interviews:..." $= \hat{\tilde{\mu}}_t^{t-1} = \tilde{\iota}_t \hat{s}_t$

Overoptimism $\Rightarrow$ expected $>$ observed interview rate

$$\frac{\hat{\tilde{\mu}}_t^{t-1}}{\hat{s}_t} \sim \tilde{\iota}_t > \iota_t \sim \frac{\hat{\iota}_t}{\hat{s}_t}$$

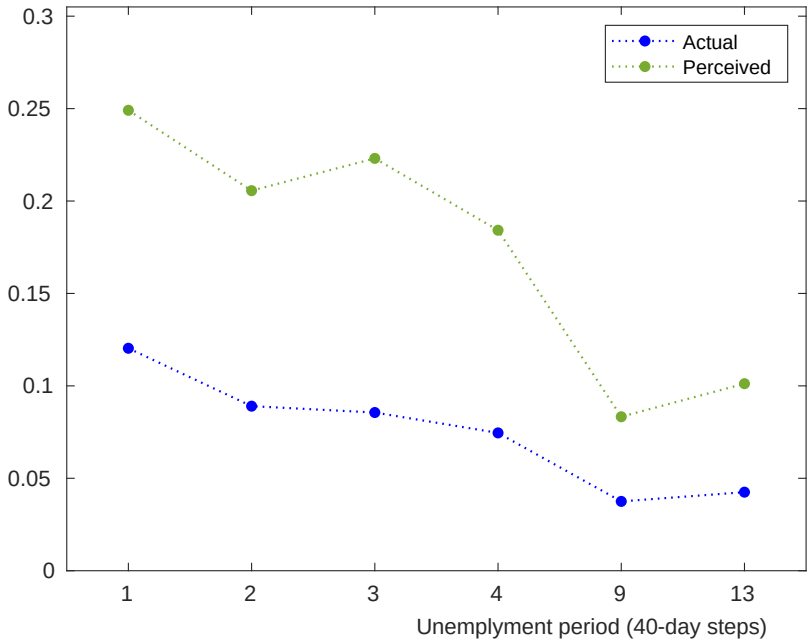


Figure: Controls

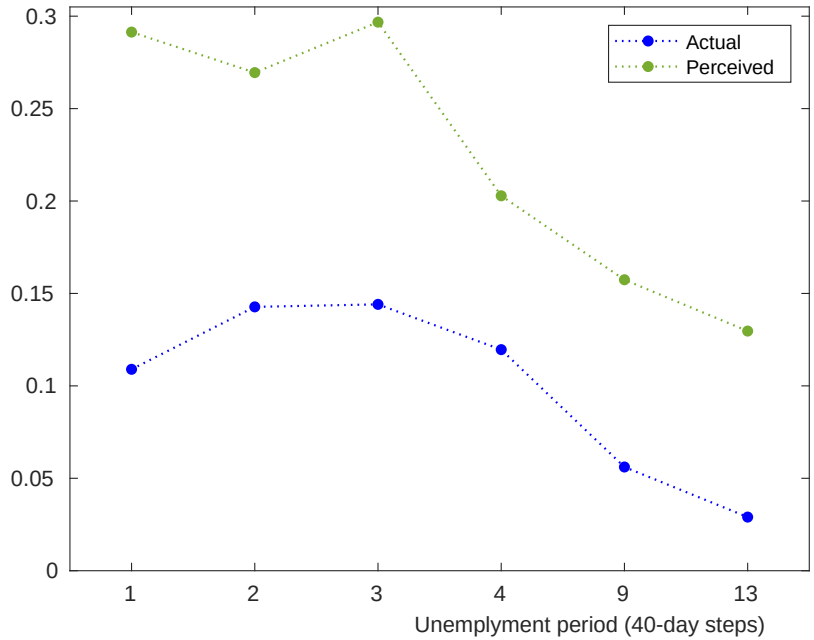


Figure: Treated

Learning: Bias declines, especially for $t > 3$

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- **Job search model with biased beliefs**
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Job search with biased beliefs

- Discrete time search model with multiple interviews per period
- Each interview leads to a job offer (possibly very low wage)
- Biased beliefs about expected # interviews (but known wage offer distribution).
- Quasi-Bayesian learners using *perceived* instead of actual interviews as signals.
- Imposed structure on program effects:
  - *Intensified counseling* affects *cost of search*
  - *Coaching*
    - (i) arrival *rate* of interviews;
    - (ii) initial beliefs & perceptions about realized interviews
- For simplicity, no job destruction.

Timing of actions and events

1. At start of each period t, job seekers have (possibly biased) *prior* beliefs about # interviews, i.e. *on average* $\tilde{\mu}_t^{t-1} = \tilde{\iota}^{t-1} s_t$ given search effort s_t;
2. They choose s_t^* and w_t^R, given their prior beliefs;
3. Interviews arrive at *true* rate ι, i.e. average $\# = \mu_t = \iota s_t$. All interviews result in offers.
4. At the end of t they received $\hat{\iota}_t$ invitations ($=$ 'signal') and make a choice:
   - (i) If the highest offer $> w_t^R$, UE is left and individuals remain employed.
   - (ii) If no interview or the highest offer $< w_t^R$, then they update beliefs to *posterior* given the perceived history $\{s_\tau^*, \Psi_{\tau-t} \hat{\iota}_\tau^*\}_{\tau=1}^t$.

(return) The next period $t+1$ starts. Job seekers returns to step 1 with $t+1$ replacing t and the *posterior* belief replacing the *prior*.

Belief formation: **quasi**-Bayesian updating

Updating in each period ($t > 0$) multiplies the Gamma prior of ι in $t-1$ by the likelihood of the *perceived* interview rate $\tilde{\Psi}_0\ \hat{\iota}_t$, resulting in a Gamma posterior of ι at end of t ($=$ prior in $t+1$), i.e. $\mathcal{G}(A_t, B_t)$ where

$$A_t = A_0 + \sum_{\tau=1}^{t} \tilde{\Psi}_{(\tau-t)} \hat{\iota}_\tau \quad \text{and} \quad B_t = B_0 + \sum_{\tau=1}^{t} s_\tau,$$

and where $A_0 = \tilde{\alpha}$ ($\sim$ initial precision) and $B_0 = \tilde{\alpha}/\tilde{\iota}^0$.

Given this posterior, the subjective expectation at time t of the # of interviews in $t+1$ is

$$E^t\left[\mu_{t+1} | \{s_\tau, \hat{\iota}_\tau\}_{\tau=1}^{t}\right] \equiv \tilde{\mu}_{t+1}^t \equiv \tilde{\iota}^t s_{t+1} = \frac{A_t}{B_t} s_{t+1}$$

The *subjective* probability that $\hat{\iota}_t$ interviews arrive in period t is obtained by taking the expectation over the objective Poisson arrival rate, resulting in a Negative Binomial distribution $\tilde{P}_t^{t-1}(\hat{\iota}_t)$

Justification of generalized Bayesian learning

$$\tilde{\Psi}_{(\tau-t)} = \tilde{\psi}_0 \tilde{\psi}_1^{(t-\tau)}; \quad \text{for } 1 \leq \tau \leq t$$

Justifications:

- *Theory of 'motivated beliefs'*:
  Selective recall: people tend to forget negative feedback to remain motivated or because they derive utility from optimistic beliefs
  $\Rightarrow \tilde{\psi}_0 > 1$ & $\tilde{\psi}_1 = 1 \Rightarrow$ persistent overoptimism
  (Bénabou & Tirole, 2016, JEP; Zimmermann, 2020, AER; Huffman et al. 2022, AER)
- Forecasters update but typically *overreact* to new signals because memorizing the past is costly $\Rightarrow \tilde{\psi}_0 = 1$ & $\tilde{\psi}_1 < 1$.
  (Azeredo da Silveira, Sung & Woodford, 2024; AER; Bordalo et al., 2020, AER; Afzouri et al. 2023, QJE)
- We find a combination: $\tilde{\psi}_0 \approxeq 3 > 1$ & $\tilde{\psi}_1 \approxeq 0.7 \Rightarrow$ overoptimistic about recent signals but fading over time.

Wage offers and wage offer distribution within periods

- Assume that *each* of $\hat{\imath}_t$ interviews leads to job (=wage) offer
- Within each period the best wage offer is retained: the distribution of the maximum of $\hat{\imath}$ offers is $F^{[\hat{\imath}]}(w) \equiv [F(w)]^{\hat{\imath}}$

The Value of Unemployment

$$\tilde{U}_t^{t-1} = \max_{\{w_t^R,\, s_t\}} \left\{ \begin{array}{l} b_t - c\left(s_t\right) + \beta \left[\left(1 - \tilde{h}_t^{t-1}\right) \tilde{U}_{t+1}^{t-1} \right. \\ \left. + \sum_{i=1}^{\infty} \tilde{h}_t^{t-1}(i) E_w^{[i]} \left[\frac{w}{1-\beta} | w \geq w_t^R \right] \right] \end{array} \right\} \quad (1)$$

where

- $\tilde{h}_t^{t-1}(i) \equiv \tilde{P}_t^{t-1}(i) \left[1 - \bar{F}^{[i]}\left(w_t^r\right)\right]$ is the at $t-1$ subjectively perceived probability that in period t $i > 0$ interviews arrive and that the largest wage offer w emerging from these interviews is acceptable; β is the discount factor.
- $\tilde{h}_t^{t-1} \equiv \sum_{i=1}^{\infty} \tilde{h}_t^{t-1}(i)$ is the corresponding subjectively perceived discrete hazard rate to employment in period t.

The FOC of job search intensity and reservation wage

$$c'(s_t) = \beta \sum_{i=1}^{\infty} \frac{\partial \tilde{h}_t^{t-1}(i)}{\partial s_t} \left[E_w^{[i]} \left[W(w) | \, w \geq w_t^R \right] - \tilde{U}_{t+1}^{t-1} \right] \tag{2}$$

$$\tilde{U}_{t+1}^{t-1} = W\left(w_t^R\right) = \frac{w_t^R}{1-\beta}. \tag{3}$$

Specification

- utility: linear
- cost of search: $c(s_t) = \left[e^{\zeta_1 s_t} - 1\right]$
- Offered wages lognormally distributed with multiplicative measurement error.
- Treatment multiplies $c^{'}(s_t)$, ι, and belief parameters $(\tilde{\iota}, \tilde{\alpha}, \tilde{\psi}_0, \tilde{\psi}_1)$ by $\exp(\text{coeff})$.

Estimation

- Solution: backward solution in each t from stationary solution after benefit expiration using the subjective prior belief given at the start of t and resolve in each t after update of belief
- Estimation $=$ simulated method of moments: allows to replace missing $\hat{\imath}$ by simulations (S=5)
- We match 2×43 moments over 16 periods (6 periods for # applications and (expected) interviews)
  - (i) cumulative hazard rates from unemployment;
  - (ii) # applications
  - (iii) # expected interviews
  - (iv) # realized interviews
  - (v) 9 quantiles of the accepted wage earnings distribution

Outline

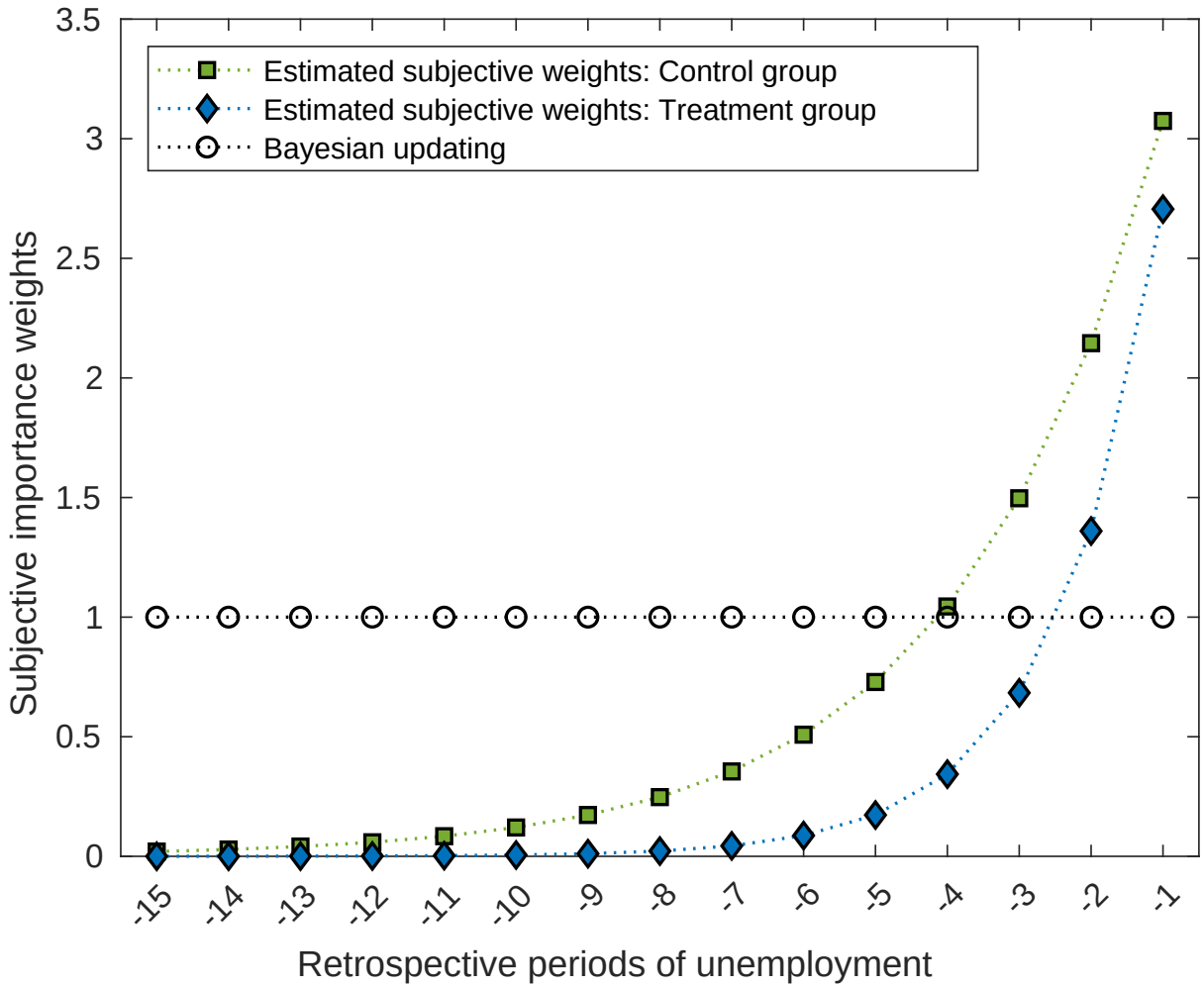
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Parameter estimates

	Model parameters					Treatment effect parameters			
	coeff.	s.e.	z-stat	p-value		coeff.	s.e.	z-stat	p-value
ζ_1	0.5255	0.0066	79.0861	0.0000	γ_{ζ_1}	-0.0605	0.0163	-3.7120	0.0002
ι	0.0866	0.0011	78.5172	0.0000	γ_{ι}	0.0964	0.0346	2.7879	0.0053
$\tilde{\iota}$	0.2111	0.0024	87.6501	0.0000	$\gamma_{\tilde{\iota}}$	1.1966	0.3183	3.7592	0.0002
$\tilde{\alpha}$	0.0529	0.0054	9.8061	0.0000	$\gamma_{\tilde{\alpha}}$	-0.3997	1.1506	-0.3474	0.7283
$\tilde{\psi}_0$	3.0745	0.2693	11.4176	0.0000	$\gamma_{\tilde{\psi}_0}$	-0.1278	0.1719	-0.7432	0.4573
$\tilde{\psi}_1$	0.6978	0.0465	15.0024	0.0000	$\gamma_{\tilde{\psi}_1}$	-0.3281	0.1643	-1.9970	0.0458
μ:									
_constant (γ_0)	8.6625	0.0422	205.0856	0.0000					
productivity (γ_1)	0.9162	0.5789	1.5828	0.1135		Obj.Function:		132.97	
σ	0.0658	0.0076	8.6230	0.0000					
ω	0.2567	0.0009	295.5725	0.0000					

Table 1: Estimation results for the Control and Treatment groups (S=5)

Implied subjective importance weights for signals



Fit of Model

- Mostly excellent: within 95% CI.
- Only for realized interviews some overestimation at long UE duration.

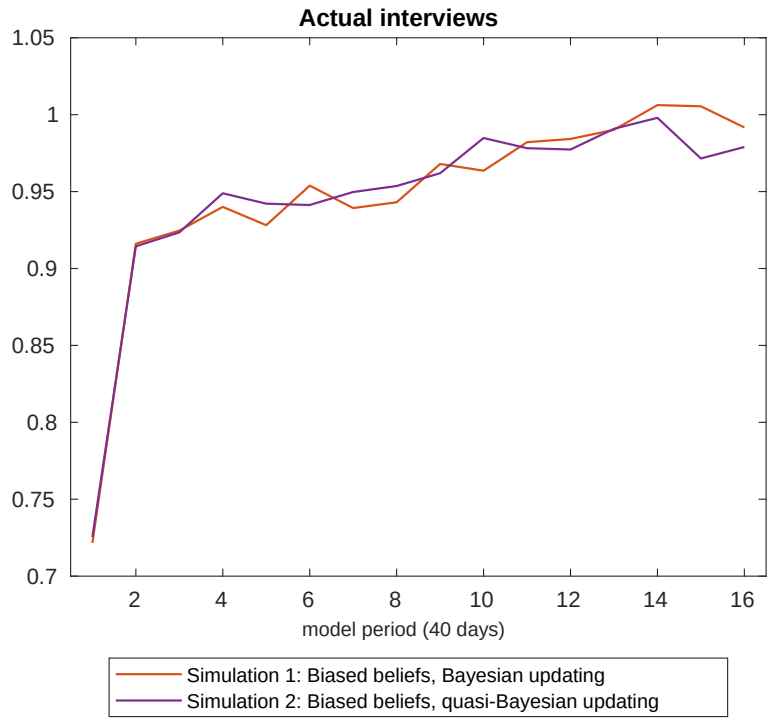
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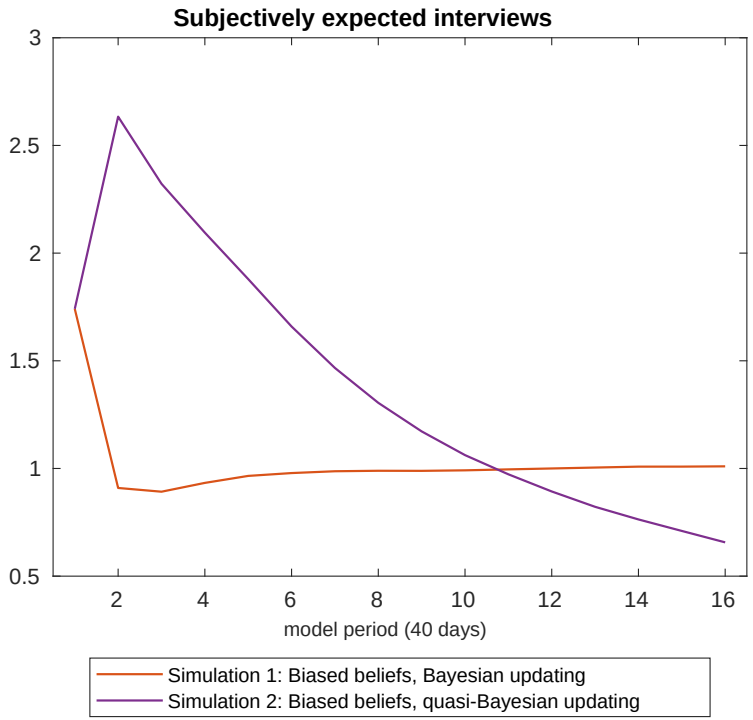
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Impact of biased prior & 'quasi'-Bayesian learning (1)

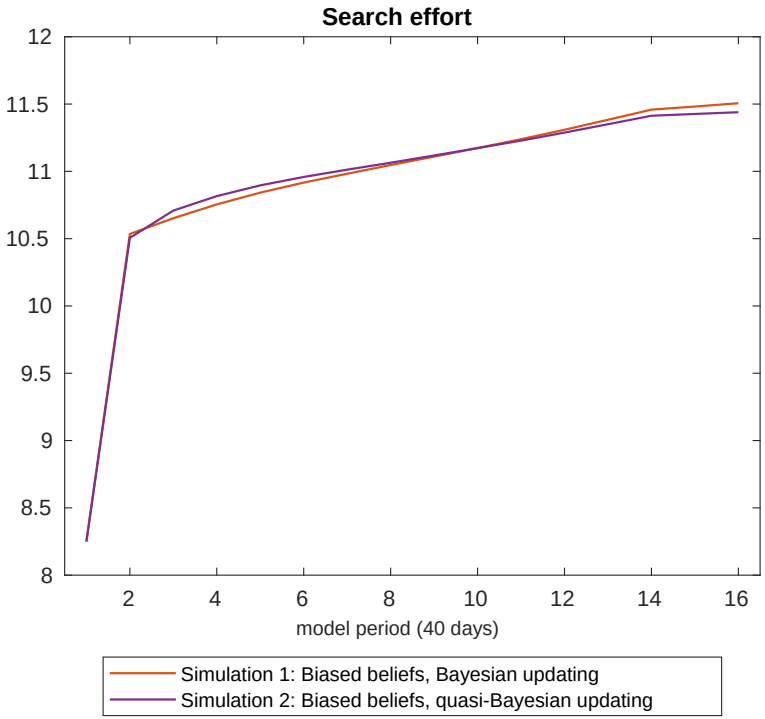
- Bias initial belief little effect: quasi-Bayesian (purple) is key
- Actual interviews not affected because search not affected: see next slide

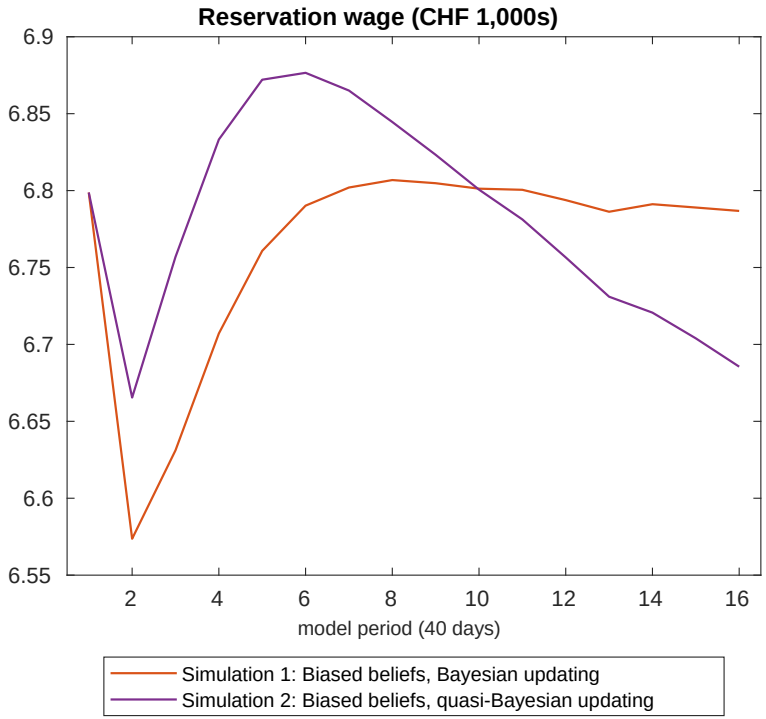




Impact of biased prior & 'quasi'-Bayesian learning (2)

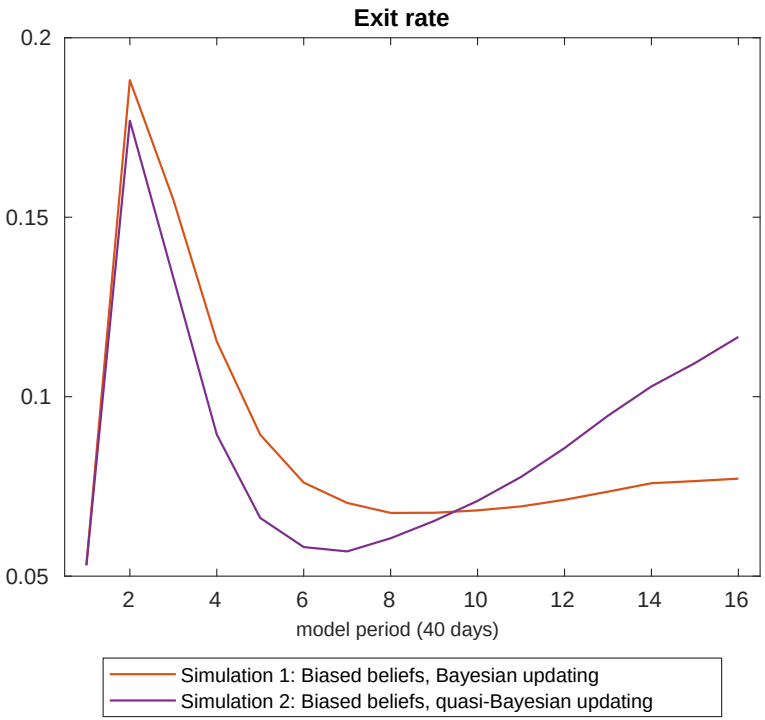
- Beliefs do not matter for search effort; only reservation wage
- 'quasi'-Bayesian (purple) $\Rightarrow$ selective by initial optimism, then less by increasing pessimism.

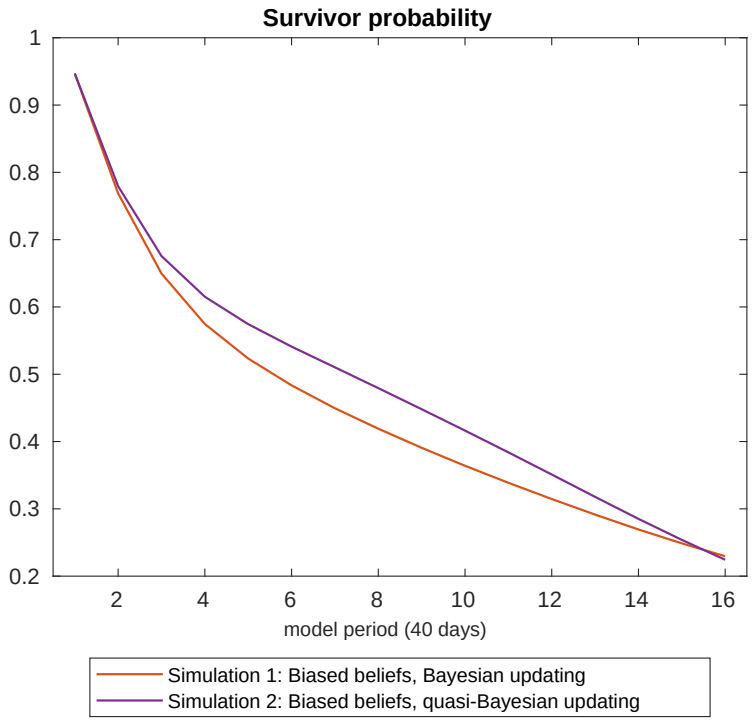




Impact of biased prior & 'quasi'-Bayesian learning (3)

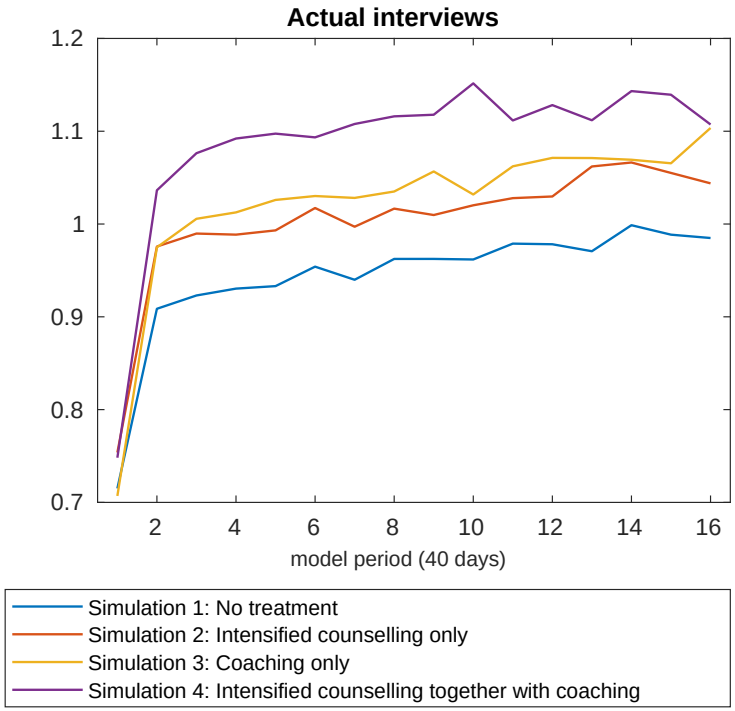
- bias initial belief hardly any effect on job finding
- quasi-Bayesian (purple) $\Rightarrow$ exit mirrors reservation wage: initial slower exit, then faster.

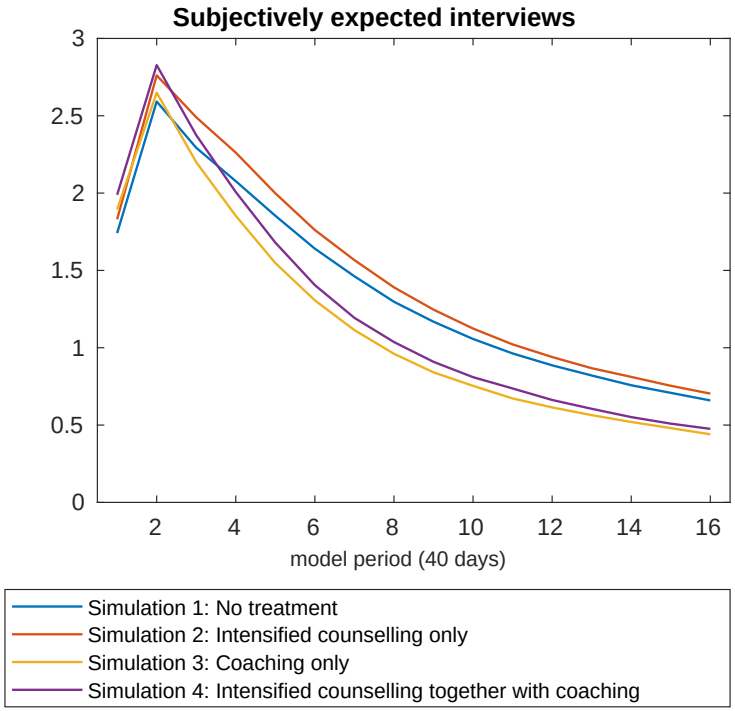




Program effects: coaching vs counseling (1)

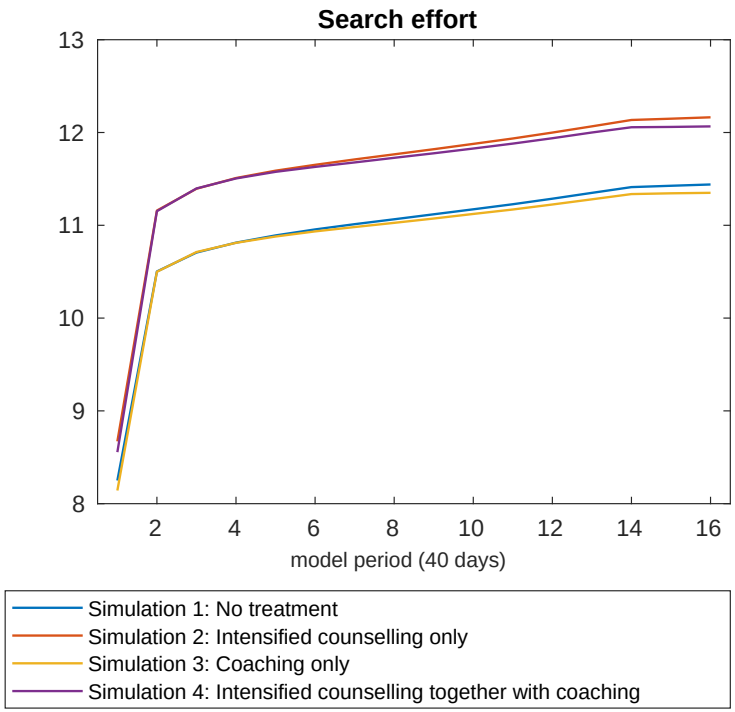
- Both coaching (yellow) & counseling (red) induce actual interviews ↑.
- Counseling (red) leads to (slight) ↑ of expectations ↔ for coaching (yellow) expectations ↓, as direct effect on belief formation dominates (not shown).

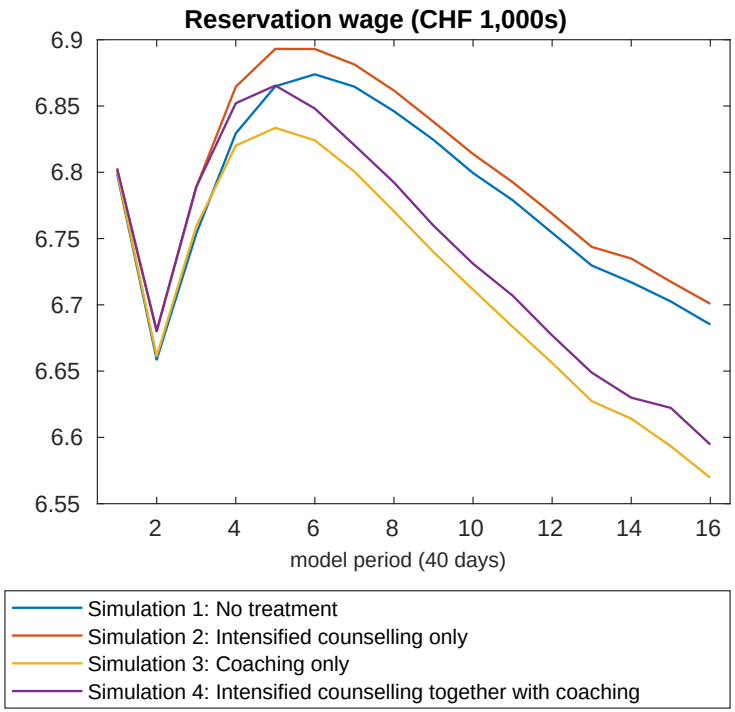




Program effects: coaching vs counseling (2)

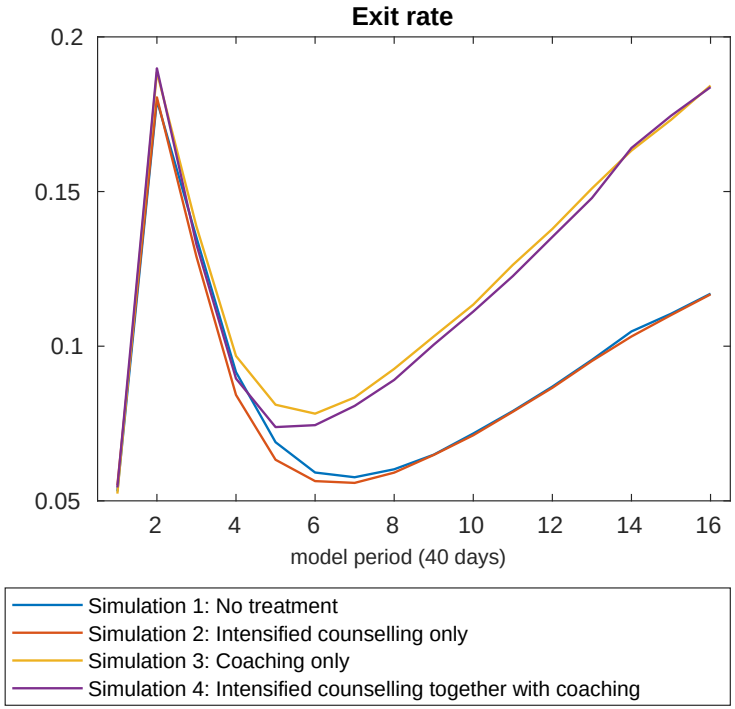
- Only counseling (red) requires more search effort for actual interviews ↑ (as costs ↓): coaching requires no extra effort (as search efficiency ↑).
- Coaching (yellow) affect expectations ↓ ⇒ reservation wage ↓ ↔ counseling (red) (slightly) ↑.

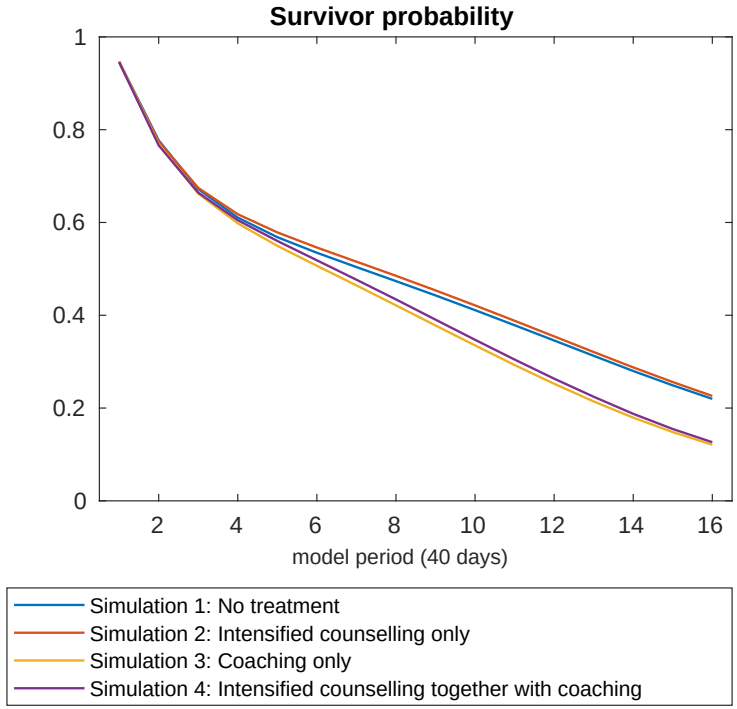




Program effects: coaching vs counseling (3)

- Counseling (red) no effect on job finding: higher selectivity undoes + effect on effort $\leftrightarrow$ for coaching (yellow), effect of lower selectivity dominates $\Rightarrow$ exit $\uparrow$.
- **Not shown** (See 46): within coaching, + effect of search efficiency undone by enhanced selectivity $\Rightarrow$ exit $\uparrow$ only by Δ beliefs!





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Conclusion

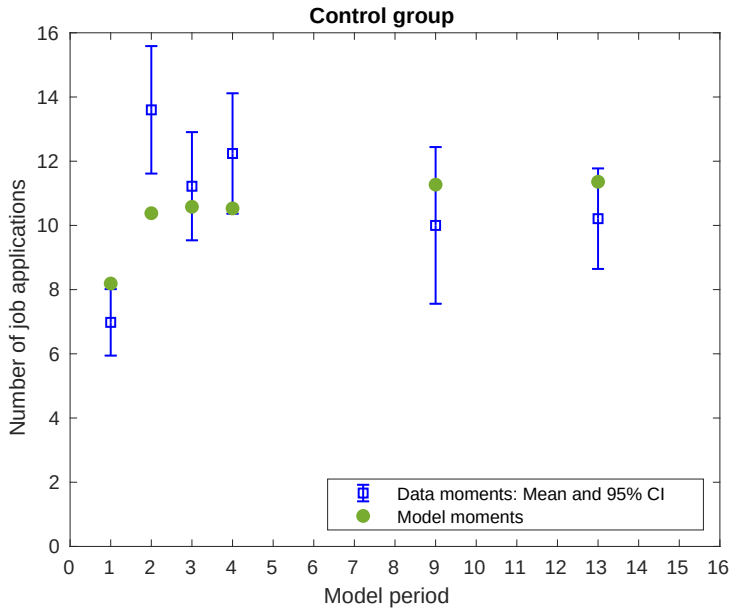
- A new framework to study belief formation in job search & how this influences job search behavior & outcomes.
- Like many other, we find evidence of overoptimism, but unlike most, no evidence of persistent beliefs.
- Belief formation significantly influences both behavior and outcomes, and beliefs are *malleable* and capable of inducing meaningful changes in both.

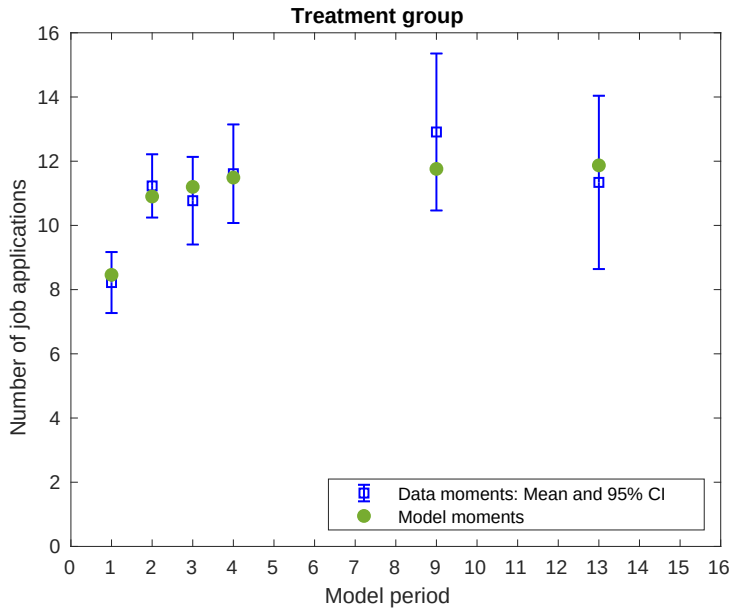
- Reconciling our result of lack of persistence with existing findings:
  - Persistence induced by over-reaction to positive news about aggregate labor market. (See He and Kircher, 2025, *mimeo*).
  - In Switzerland, UE-rate increases from 2.8% to 4.4% from 2007/12 to 2009/12 $\Rightarrow$ More rapid decline in optimism?

Thank you for listening!

Comments very welcome.

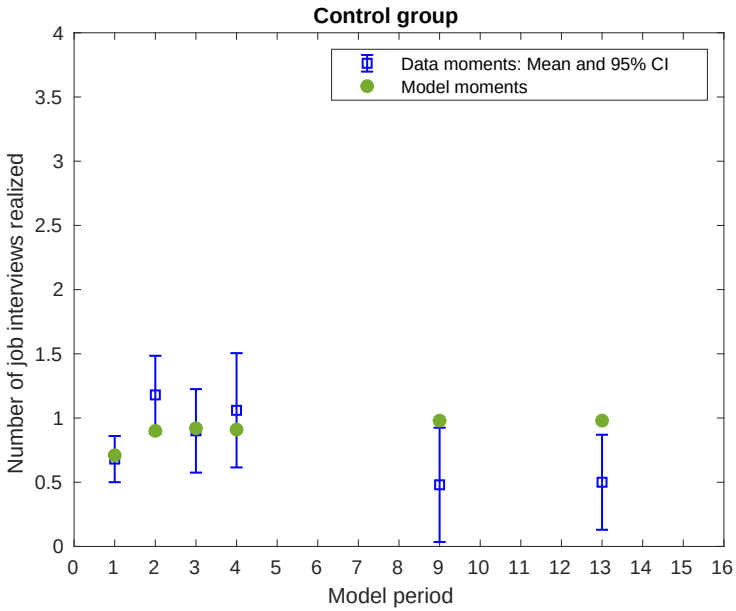
Fit of search effort and # applications

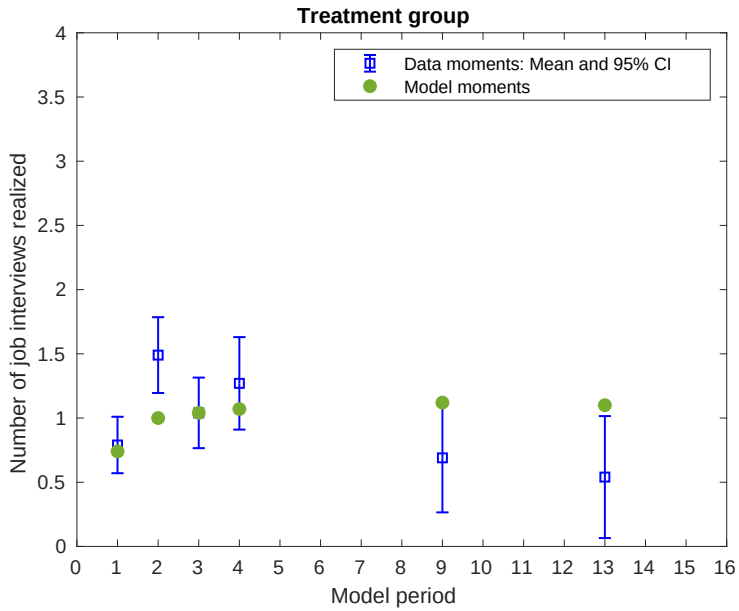




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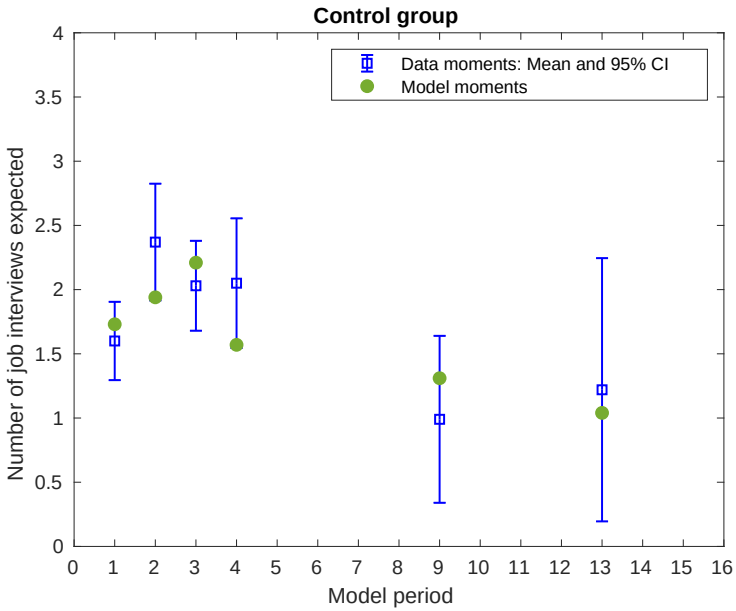
Fit of realized interviews

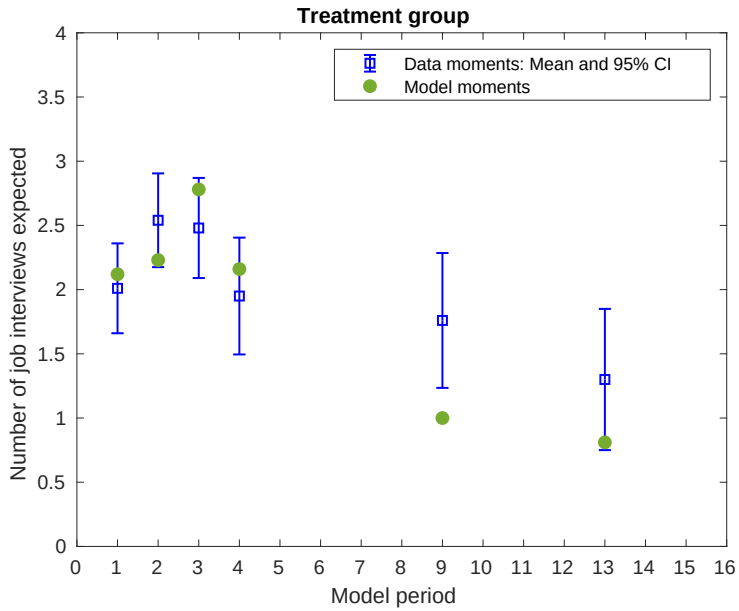




Back to 27

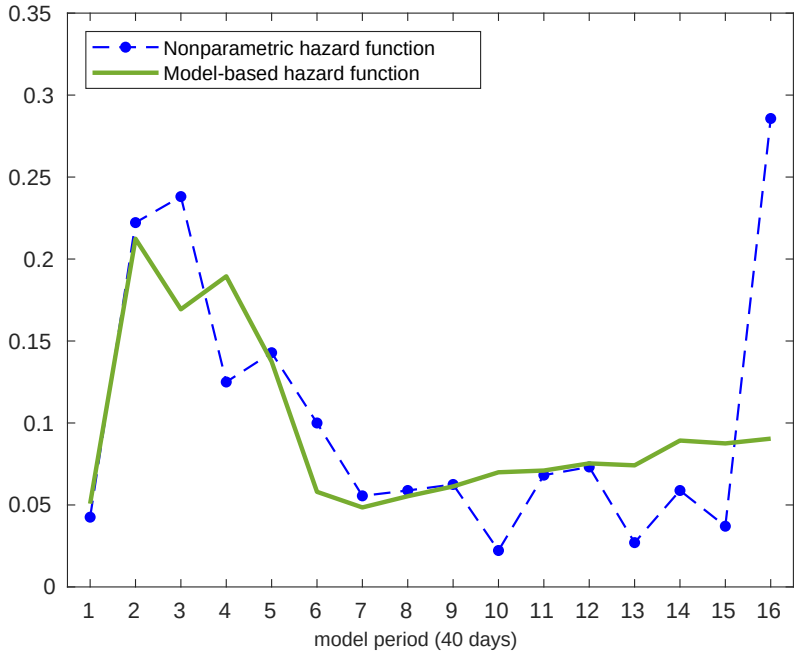
Fit of expected interviews

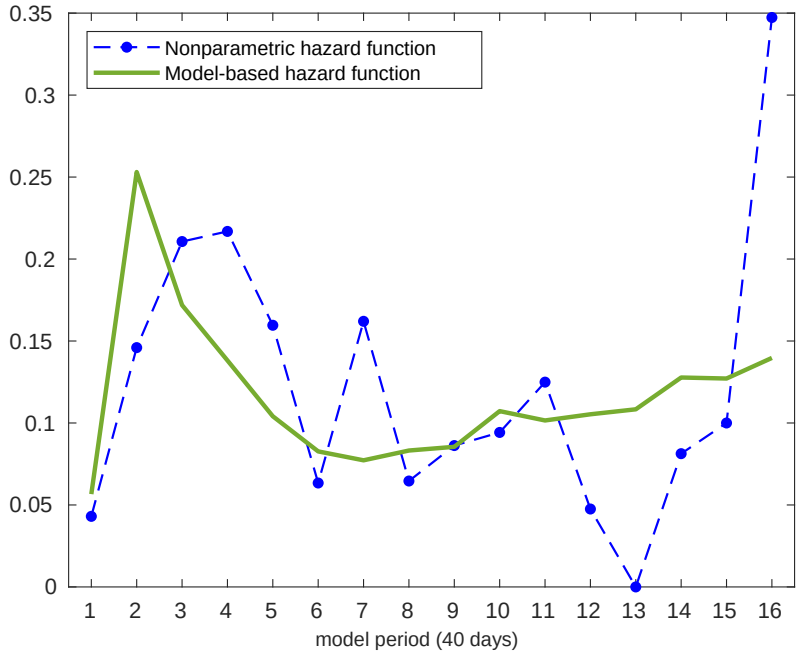




Back to 27

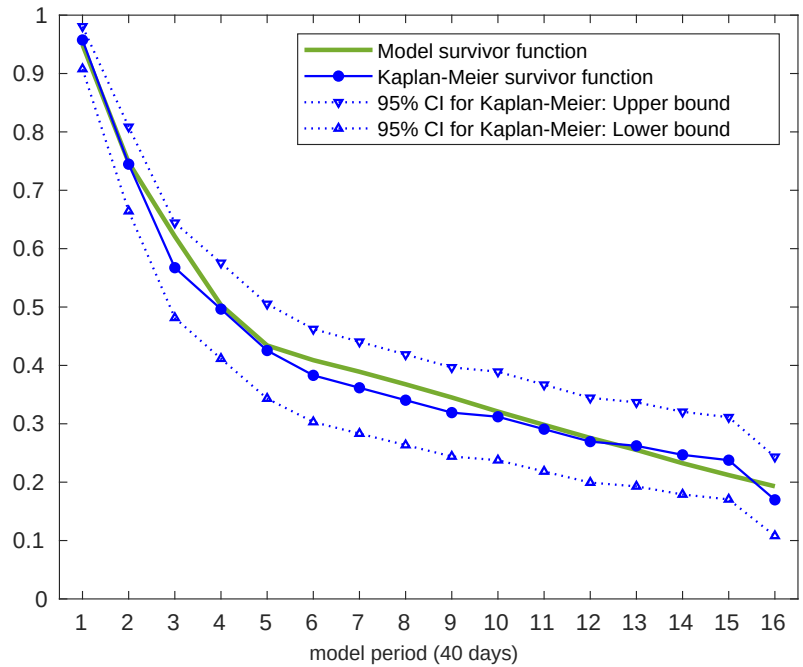
Fit of hazard function: control left & treated right

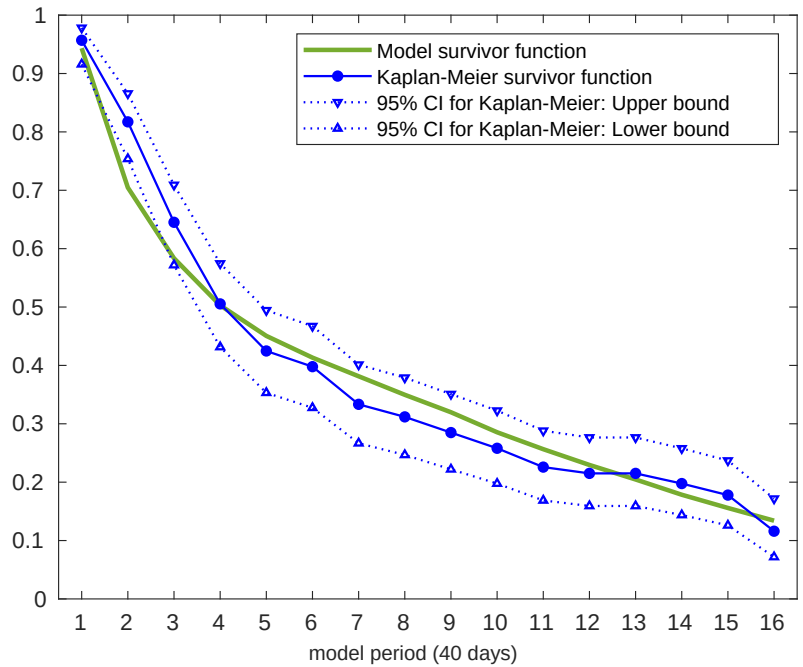




Back to 27

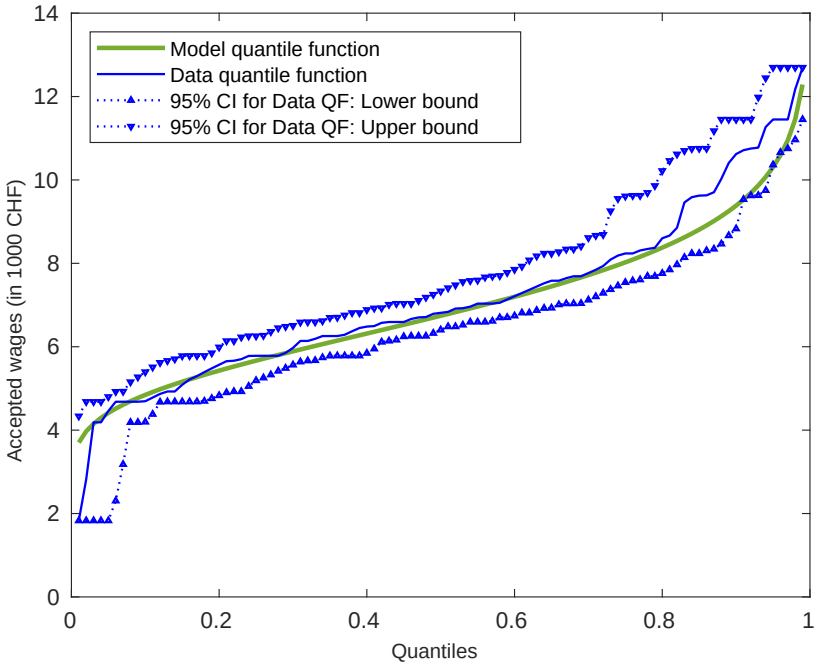
Fit of Survivor function: control left & treated right

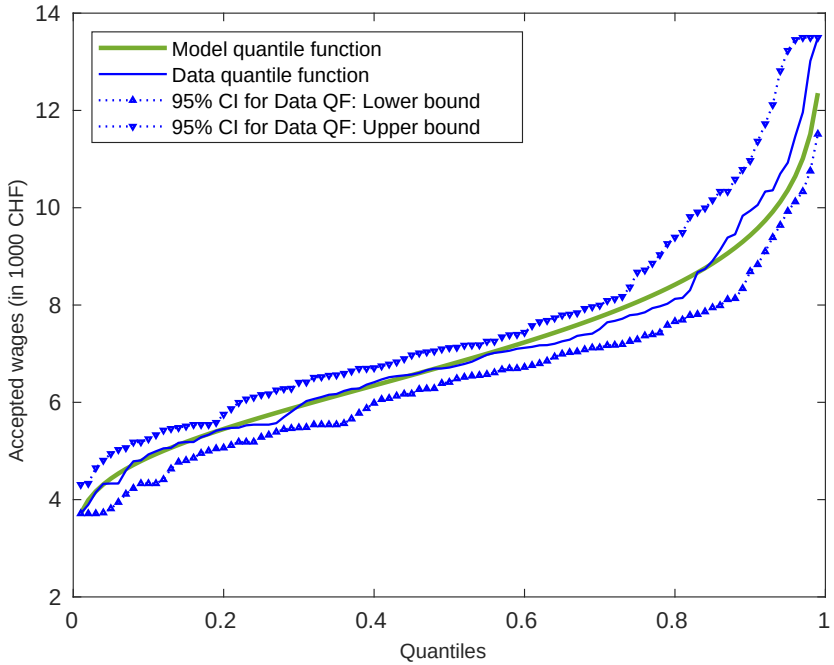




Back to 27

Fit of wage distribution: control left & treated right





Back to 27

Posterior Mean as Weighted Average of History and New Signal

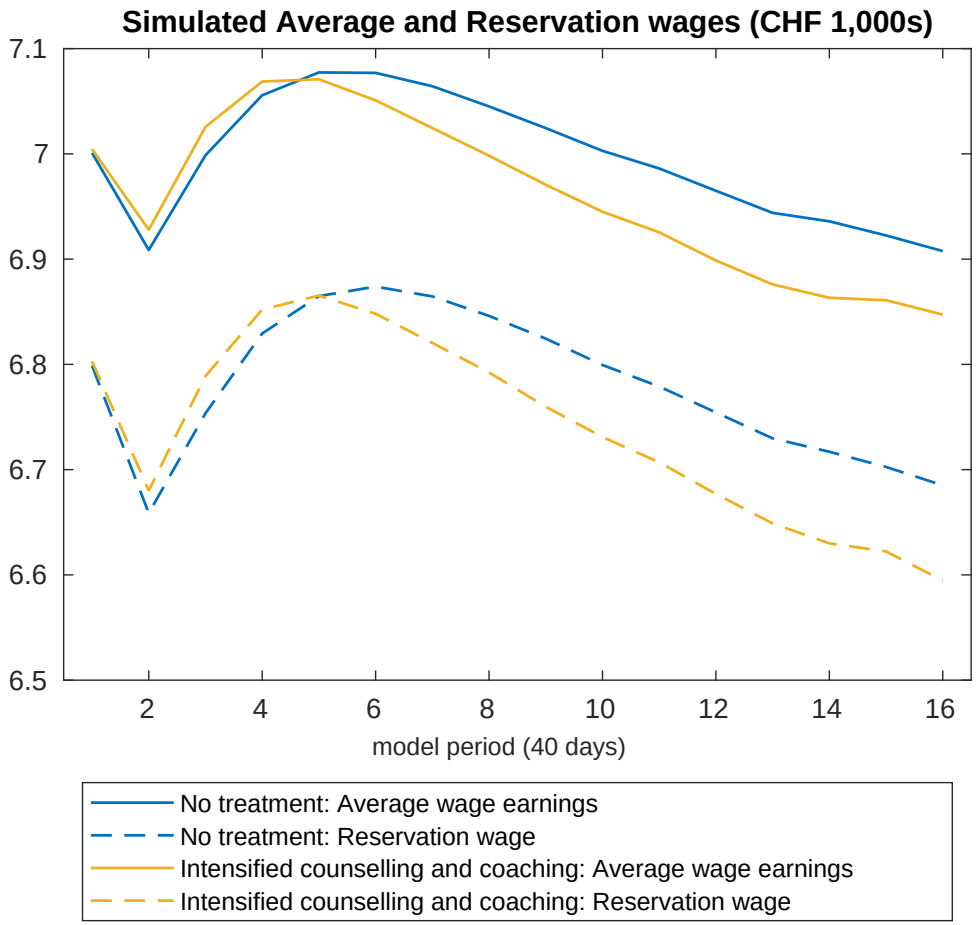
Given the Gamma posterior, the subjective expectation at time t of the # of interviews in $t+1$ is

$$E^t\left[\mu_{t+1}|\{s_\tau,\hat{\iota}_\tau\}_{\tau=1}^t\right]\equiv\tilde{\mu}_{t+1}^t\equiv\tilde{\iota}^t s_{t+1} = \frac{A_t}{B_t}s_{t+1} = \left[(1-\omega_t)\tilde{\iota}^{t-1}+\omega_t\frac{\tilde{\Psi}_0\hat{\iota}_t}{s_t}\right]s_{t+1}$$

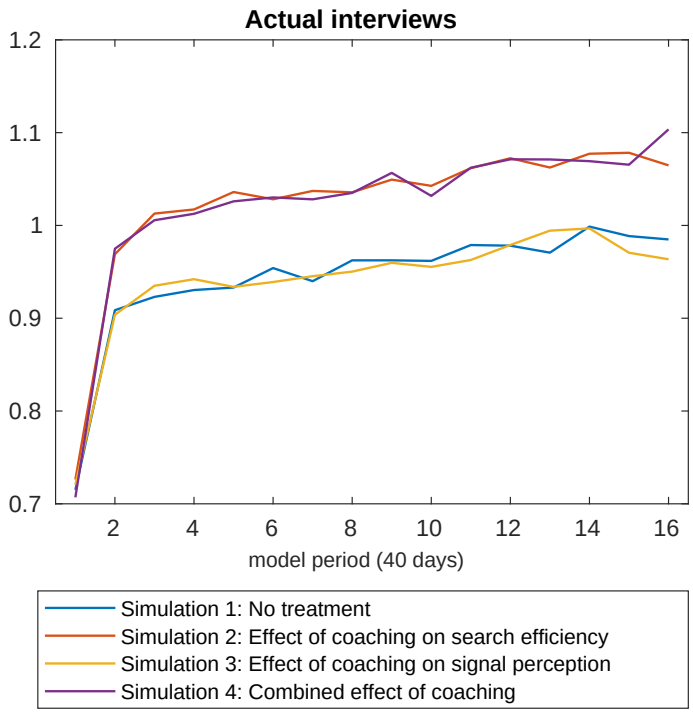
with $\omega_t \equiv \omega_t^B \frac{B_{t-1}\tilde{\Psi}_0+s_t}{B_{t-1}+s_t}$ and $\omega_t^B \equiv \frac{\hat{\tau}_t}{\hat{\tau}_t+\tilde{\tau}_t}$ where $\hat{\tau}_t$ & $\tilde{\tau}_t$ are the precision of resp., the most recent *perceived* signal of ι & its prior, both in t.

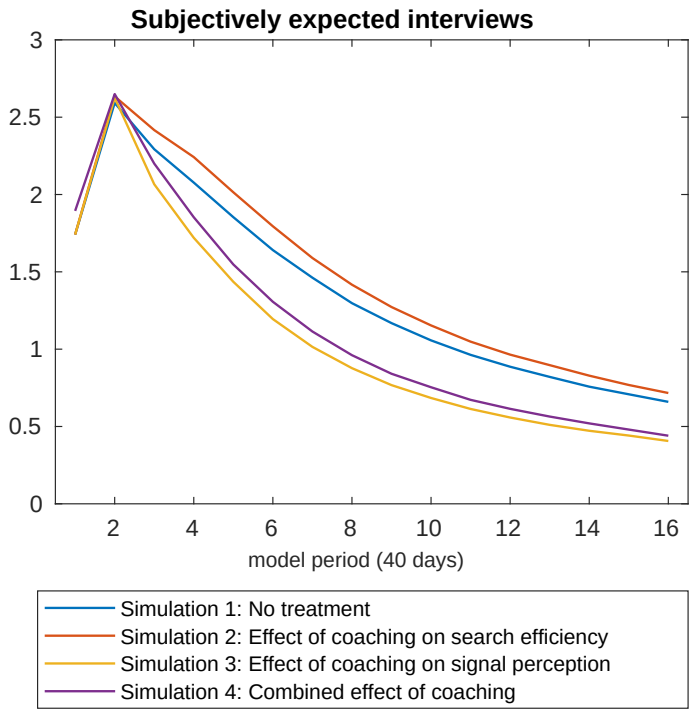
Back to **??**

Program effects: coaching vs counseling - effects on wages

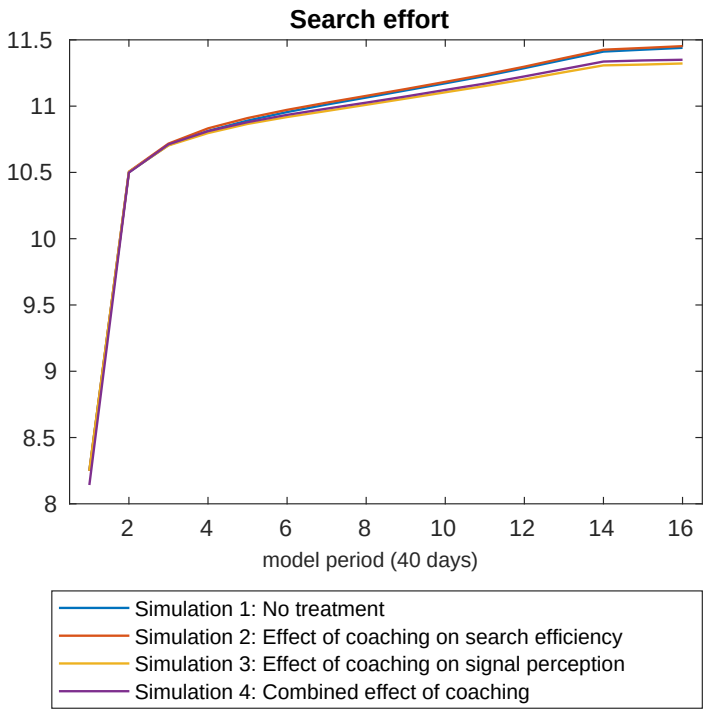


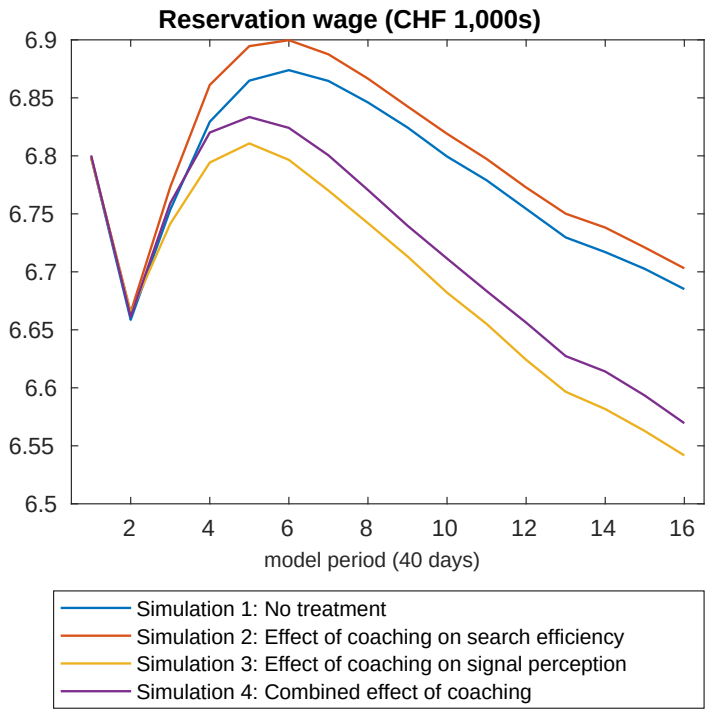
Program effects: decomposition counseling (1)



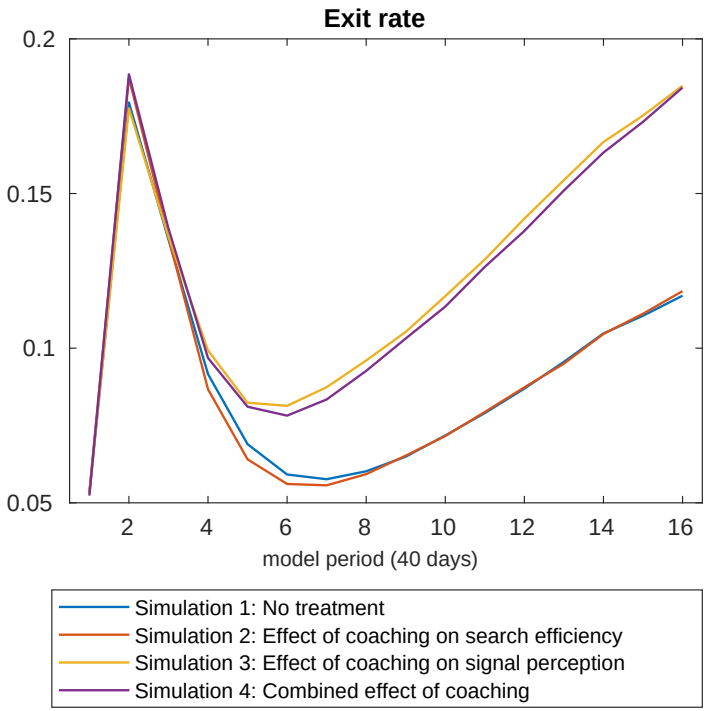


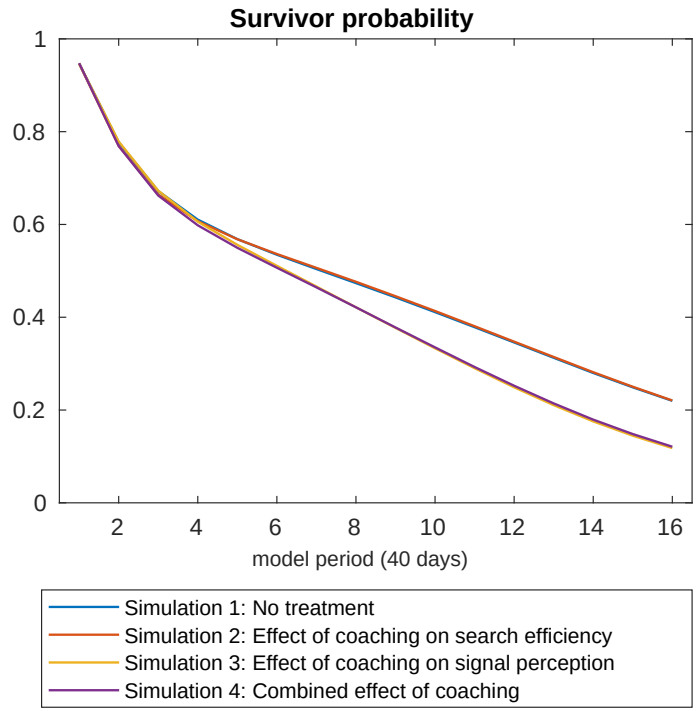
Program effects: decomposition counseling (2)





Program effects: decomposition counseling (3)





Back to 34

Fit of # applications and (expected) interviews

		Control Group					Treatment Group				
Model period		Model moments	Data moments mean	95% CI	obs		Model period		Model moments	Data moments mean	95% CI	obs
Number of job applications							Number of job applications					
1		8.19	6.98	[5.94, 8.01]	129		1	*	8.46	8.22	[7.27, 9.17]	172
2		10.38	13.60	[11.61, 15.58]	87		2	*	10.90	11.23	[10.24, 12.21]	121
3	*	10.58	11.22	[9.54, 12.91]	56		3	*	11.20	10.77	[9.40, 12.13]	78
4	*	10.53	12.24	[10.36, 14.11]	46		4	*	11.49	11.61	[10.08, 13.15]	62
9	*	11.27	10.00	[7.56, 12.44]	15		9	*	11.76	12.91	[10.47, 15.36]	25
13	*	11.36	10.21	[8.65, 11.78]	20		13	*	11.87	11.34	[8.64, 14.04]	16
Number of job interviews realized							Number of job interviews realized					
1	*	0.71	0.68	[0.50, 0.86]	129		1	*	0.74	0.79	[0.57, 1.01]	172
2	*	0.90	1.18	[0.88, 1.49]	87		2	*	1.00	1.49	[1.19, 1.78]	121
3	*	0.92	0.90	[0.57, 1.22]	59		3	*	1.04	1.04	[0.77, 1.32]	78
4	*	0.91	1.06	[0.61, 1.50]	46		4	*	1.07	1.27	[0.91, 1.63]	62
9		0.98	0.48	[0.03, 0.92]	15		9		1.12	0.69	[0.26, 1.11]	25
13		0.98	0.50	[0.13, 0.87]	20		13		1.10	0.54	[0.06, 1.01]	16
Number of job interviews expected							Number of job interviews expected					
1	*	1.73	1.60	[1.30, 1.91]	130		1	*	2.12	2.01	[1.66, 2.36]	167
2	*	1.94	2.37	[1.92, 2.83]	80		2	*	2.23	2.54	[2.17, 2.90]	116
3	*	2.21	2.03	[1.68, 2.38]	57		3	*	2.78	2.48	[2.08, 2.86]	79
4	*	1.57	2.05	[1.54, 2.55]	44		4	*	2.16	1.95	[1.50, 2.41]	57
9	*	1.31	0.99	[0.34, 1.64]	13		9		1.00	1.76	[1.23, 2.28]	26
13	*	1.04	1.22	[0.36, 2.41]	7		13	*	0.81	1.30	[0.75, 1.85]	22

Table 2: Goodness of fit: Job applications and interviews

Arni, P. (2015). Opening the Blackbox: How Does Labor Market Policy Affect the Job Seekers' Behavior? A Field Experiment. Working Paper 9617, IZA.

Azereido Da Silveira, R., Y. Sung, and M. Woodford (2024). Optimally Imprecise Memory and Biased Forecasts. *American Economic Review 114*(10), 3075–3118.

Caliendo, M., R. Mahlstedt, A. Smeißer, and S. Wagner (2024). The Accuracy of Job Seekers' Wage Expectations. Discussion Paper 17198, IZA.

Conlon, J. J., L. Pilossoph, M. Wiswall, and B. Zafar (2018). Labor Market Search with Imperfect Information and Learning. Working Paper 24988, NBER.

Krueger, A. B. and A. I. Mueller (2016). A Contribution to the Empirics of Reservation Wages. *American Economic Journal: Econmic Policy 8*(1), 142–179.

Moore, D. A. and P. J. Healy (2008). The Trouble With Overconfidence. *Psychological Review 115*, 502–517.

Mueller, A. I. and J. Spinnewijn (2023). Chapter 22 - Expectations data, labor market, and job search. In R. Bachmann, G. Topa, and W. van der Klaauw (Eds.), *Handbook of Economic Expectations*, pp. 677–713. Academic Press.

Mueller, A. I., J. Spinnewijn, and G. Topa (2021). Job Seekers' Perceptions and Employment Prospects: Heterogeneity, Duration Dependence, and Bias. *American Economic Review 111*(1), 324–363.

Potter, T. (2021). Learning and Job Search Dynamics during the Great Recession. *Journal of Monetary Economics 117*, 706–722.

Rabin, M. (2013). Incorporating Limited Rationality into Economics. *Journal of Economic Literature 51*(2), 528–543.

Spinnewijn, J. (2015). Unemployed but Optimistic: Optimal

Insurance Design with Biased Beliefs. *Journal of the European Economic Association 13*(1), 130–167.

Tversky, A. and D. Kahneman (1974). Judgment under Uncertainty: Heuristics and Biases. *Science 185*, 1124–1131.