Social Insurance Design with Behavioral Agents

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Motivation

- Spectacular advances in past 20 yrs in research on social insurance
- Important driver has been the tight integration between theory & empirics:
  1. revisiting 'old' theories to make them empirically implementable
  2. implementing theories leveraging new admin data sources
- Growing body of research documenting importance of behavioral frictions, also in social insurance
- **Key challenges**:
  1. implementation of theories relies on optimizing behavior – envelope conditions & revealed preference
  2. admin data reveals choices, but not necessarily behavioral frictions

Roadmap

- **Conceptual framework**:
  - social insurance with moral hazard and adverse selection
  - strengths & weaknesses of framework with behavioral frictions
  - see Chetty & Finkelstein '13, Spinnewijn '15,'17, Hendren et al. '21
- **Empirical evidence**:
  - illustrations of behavioral frictions in social insurance
  - focus on unemployment insurance (UI) & health insurance (HI)
- **Where to go next?**

Conceptual Framework

- Social value of insurance for individual of type θ equals

$$W_\theta(b, P) = \lambda_\theta v_\theta(b, P) - [\pi_\theta(b, P)\, b - P]$$

where:

  - $v_\theta(b, P)$ is the individual's utility given *coverage* b and *premium* P
  - $\pi_\theta(b, P)$ is the probability that risk occurs (e.g., unemployment, disability, health shock)

- Individual's utility is maximized over different dimensions of behavior:

$$v_\theta(b, P) = \max_{x \in X} v_\theta(x|b, P)$$

  - e.g., risk-reducing efforts, precautionary savings, other self-insurance, plan choice

Welfare Impact of Small Reform

- Simplify life: quasi-linear pref's + utilitarian welfare ($\lambda_\theta = 1$)

$$W_\theta(b) = v_\theta(b) - \pi_\theta(b)\, b$$

- **Variational approach**: characterize net welfare impact of 'small' change in policy

$$\frac{dW_\theta}{db} = \underbrace{\frac{\partial v_\theta}{\partial b}}_{\text{Direct Welfare Effect}} + \underbrace{\frac{\partial v_\theta}{\partial x} x'_\theta(b)}_{\text{Behavioral Welfare Effect}}$$

$$- \underbrace{\pi_\theta(b)}_{\text{Direct Fiscal Effect}} - \underbrace{\frac{\partial\left[\pi_\theta(b) b\right]}{\partial x} x'_\theta(b)}_{\text{Behavioral Fiscal Effect}}$$

- **Envelope theorem**: second-order impact of *any* behavioral response on own welfare

$$\frac{\partial v_\theta}{\partial x} = 0 \Rightarrow \text{Behavioral Welfare Effect} = 0$$

Conceptual Framework: Moral Hazard

- **Moral hazard**: insurance reduces incentives to avoid risk

$$\frac{\partial\left[\pi_\theta(b)b\right]}{\partial x}x'_\theta(b) = \frac{\partial \pi_\theta}{\partial x}x'_\theta(b)\,b = \varepsilon_{\pi_\theta,b}\pi_\theta(b)$$

- **Baily-Chetty formula**: trade-off provision of insurance and incentives

$$\frac{dW_\theta}{db} = 0 \Leftrightarrow \underbrace{\left[\frac{\partial v_\theta}{\partial b} - \pi_\theta(b)\right]/\pi_\theta(b)}_{\text{insurance value}} = \underbrace{\varepsilon_{\pi_\theta,b}}_{\text{MH cost}}$$

  - insurance value = premium individuals are willing to pay for extra dollar of coverage
  - MH cost = fiscal externality per extra dollar of coverage

- **Empirical implementation**:
  - Long literature estimating costs. Much less work on value due to lack of data.
  - Standard approach links insurance value to consumption smoothing gains, i.e., consumption wedge x risk aversion

Welfare Impact with Behavioral Agents

- Behavioral frictions: individual maximizes some *behavioral* utility that differs from *welfare-relevant* utility

$$x_\theta(b) = \max_{x \in X} \hat{v}_\theta(x|b) \neq v_\theta(x|b)$$

- Behavioral frictions drive wedge between:
  - perceived vs. true utility (e.g., biased beliefs, misinformation)
  - decision vs. experienced utility (e.g., salience, present bias)
  - frictional vs. frictionless preferences (e.g., inattention, inertia)

- Social welfare with behavioral agents:

$$W_\theta(b) = \alpha v_\theta(b) + (1-\alpha)\hat{v}_\theta(b) - \pi_\theta(b)\, b$$

Welfare Impact with Behavioral Agents

- **Welfare implications?**
  1. Envelope condition no longer holds:

$$\frac{\partial \hat{v}_\theta}{\partial x} = 0, \text{ but } \frac{\partial v_\theta}{\partial x} \neq 0$$

     $\Rightarrow$ Behavioral welfare effect becomes first-order, at least if agents are responsive!

  2. Insurance value may be higher or lower (e.g., lower savings due to present bias)
  3. Moral hazard cost may be higher or lower (e.g., less effort due to control pessimism)

- **Policy implications?**
  - Optimal policy: comparative statics wrt bias are often difficult
  - Naive policy:
    - 'standard' formula ignores 1., but accounts for 2. and 3.
    - mis-specification depends on both behavioral distortion $(\frac{\partial v_\theta}{\partial x} - \frac{\partial \hat{v}_\theta}{\partial x})$ and behavioral response $(x'_\theta(b))$

Examples of behavioral frictions in UI

- **Biased beliefs**:
  - unemployed are *baseline-optimistic* about re-employment chances, but *control-pessimistic* about returns to effort (Spinnewijn '15) Extra Material
  - unemployed do not revise their expectations downward as they remain unemployed. Overly optimistic job seekers select into LT unemployment (Mueller et al. '21) Extra Material
- **Reference-dependence**:
  - unemployed increase search effort as they approach exhaustion of UI benefits, but then decrease their effort again (DellaVigna et al. '17 and '21, but see also Marinescu & Skandelis '21) Extra Material
- **Hand-to-mouth consumption**:
  - consumption expenditures drop, not just when becoming unemployed, but also when exhausting UI benefits (Ganong and Noel '19) Extra Material
  - consumption expenditures increase when becoming unemployed and gaining access to liquid UI savings (Gerard and Naritomi '21) Extra Material

Examples of behavioral frictions in HI

- Most evidence is on behavioral frictions underlying insurance choice itself
- Concern about distorted health behaviors more generally. Specific evidence on under-use of high-value healthcare (e.g., adherence to prescription drugs)
  - *Behavioral hazard* increases value of health insurance (Baicker et al. '12)
  - Deductibles are too blunt an instrument to tackle moral hazard as individuals reduce both low- and high-value care (Brot-Goldberg et al. '17)
  - Demand for prescription fills by low-income individuals is liquidity-sensitive (Gross et al., forthcoming)
- Should we differentiate coverage more to account for behavioral biases? Or target these biases directly?

Conceptual Framework: Adverse Selection

- Assume agent's behavior involves choice between contract (b, P) and contract $\emptyset$.
- Remember: social value of insurance for individual of type θ equals

$$\lambda_\theta v_\theta(b, P) - [\pi_\theta(b, P)\, b - P] \text{ or } \lambda_\theta v_\theta(\emptyset)$$

  - denote insured by I and individuals at the margin by M

- Average welfare impact of changing price P :

$$\frac{dE[W_\theta]}{dP} = \underbrace{E_I\left[\lambda_\theta \frac{\partial v_\theta}{\partial P} + 1\right] F_I}_{\text{Direct Effect}} + \underbrace{E_M\left[\lambda_\theta \{v_\theta(b, P) - v_\theta(\emptyset)\}\right] \frac{\partial F_I}{\partial P}}_{\text{Behavioral Welfare Effect}}$$

$$+ \underbrace{\{P - E_M[\pi_\theta(b, P)]\, b\} \frac{\partial F_I}{\partial P}}_{\text{Behavioral Fiscal Effect}}$$

Adverse Selection and Value of Choice

- **Market inefficiency**: individual's risk determines both individual's valuation and insurer's cost, but cannot be observed/priced.
- Adverse selection leads to under-insurance when prices reflect average cost. Fiscal externality from expanding coverage:

$$P - E_M\left[\pi_\theta\left(b, P\right)\right] b = \left\{E_I\left[\pi_\theta\left(b, P\right)\right] - E_M\left[\pi_\theta\left(b, P\right)\right]\right\} b$$

- What is the value of offering choice in social insurance?
  - Risk-based selection can in principle be countered by setting prices right. But need to account for redistribution between more and less insured as well.
  - Fundamental value of choice depends on *selection on insurance value* $\frac{\partial v_\theta}{\partial b} - \pi_\theta$ and whether that selection is stronger than *selection on moral hazard* $\varepsilon_{\pi_\theta, b}$
  - See Hendren et al. ARE '21

Insurance Choice with Behavioral Agents

- **Behavioral frictions**: individuals choose plan that maximizes *behavioral utility*, not *welfare-relevant utility*

- Welfare implications?
  1. again, envelope condition no longer holds!
     $\Rightarrow$ correcting choice when over/under-insuring has FO effect
  2. behavioral frictions may reduce selection on insurance value
     $\Rightarrow$ reduce value of offering choice
  3. behavioral frictions may reduce selection on risk
     $\Rightarrow$ reduce scope for adverse selection
  4. incidence of behavioral frictions may change redistributive value

- Challenges?
  - revealed preference paradigm - using demand to reveal individuals' valuation - is problematic
  - but how to estimate the welfare-relevant utility??

Choice Frictions in Unemployment Insurance

- In most countries, no choice is provided – perhaps for the better!
  - Scandinavian countries provide a useful exception for research purposes (Landais et al. '21a, '21b)

- In absence of choice, we are looking for alternative methods to evaluate the insurance value for individuals or the scope for adverse selection
  - e.g., Chetty '08, Hendren '13,'17, Landais & Spinnewijn '21
  - Idea is to infer insurance value from observed responses $\frac{\partial x}{\partial y}$ to different sources of variation y
  - These methods rely on agent optimization and are often not robust to the presence of behavioral biases!

Choice Frictions in Health Insurance

- Large and continuously growing literature on different types of behavioral frictions distorting insurance choice
  - e.g., Sydnor ('10), Abaluck and Gruber ('11,...), Ketcham et al. ('12,...), Handel and Kolstad ('15), Barghava et al. ('17), Abaluck and Adams ('19), Brot-Goldberg et al. ('21),...
- Behavioral frictions interact with adverse selection
  - e.g., Fang et al. ('08), Handel ('13), Polyakova ('16), Spinnewijn ('17), Handel et al. ('19)
  - important caveat for friction-reducing policies is that we should worry about impact on adverse selection

Open Challenges Ahead

1. Provide both characterization & implementation of welfare impact that is 'behavioral-robust'
2. Account for not just one specific behavioral bias, but the overall distortion in behavior $\rightarrow$ 'sufficient-statistics' spirit
3. So far focus has been on consequences of behavioral frictions on efficiency. What about equity??

Incidence of Behavioral Frictions

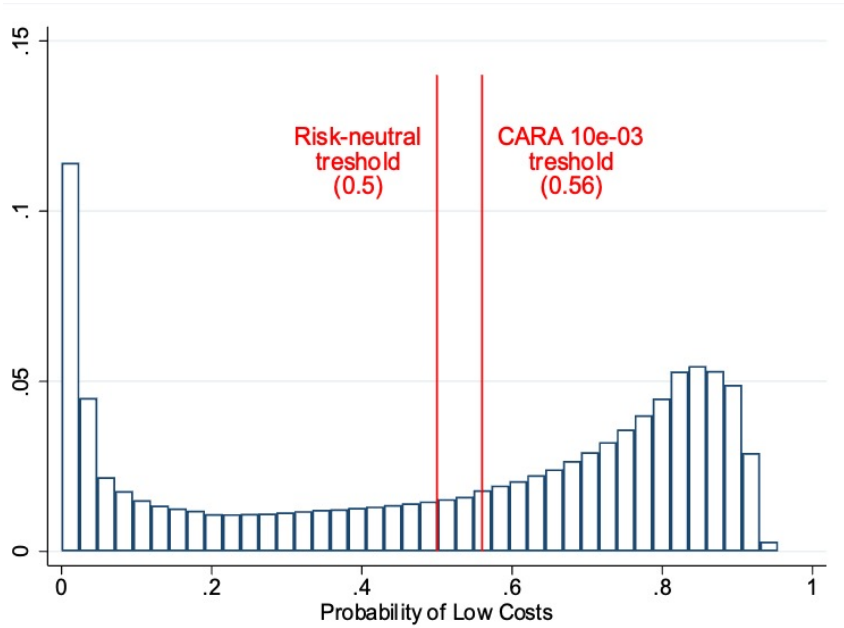
- Individuals have difficulty in making choices
- General concern that **choice quality** is strongly related to individuals' **socio-economic status**, but relatively limited evidence!
  - challenge: data and context allowing to (1) separate bias from preferences and (2) document heterogeneity for representative sample
  - few exceptions: Chetty et al. '14, Allcott et al. '19, Handel et al. '21
- Public economics is all about efficiency vs. equity, but somewhat ignored in behavioral public economics

Handel et al ('21): Inequality in Choice Quality

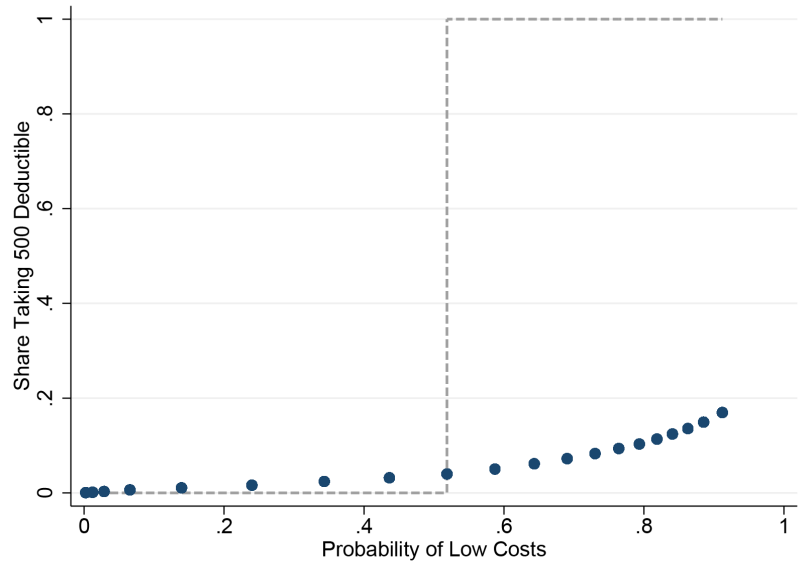
- **Context**: Dutch Health insurance - optional 500EUR deductible against premium reduction of 250EUR
- **Choice Quality**: Compare deductible choice with predicted probability that expenses remain below default deductible
- **Data**: Administrative registers with deductible choice + health records + socio-economics, education, income and financials (+ peers)

Predicted Health Exp's and Deductible Take-up

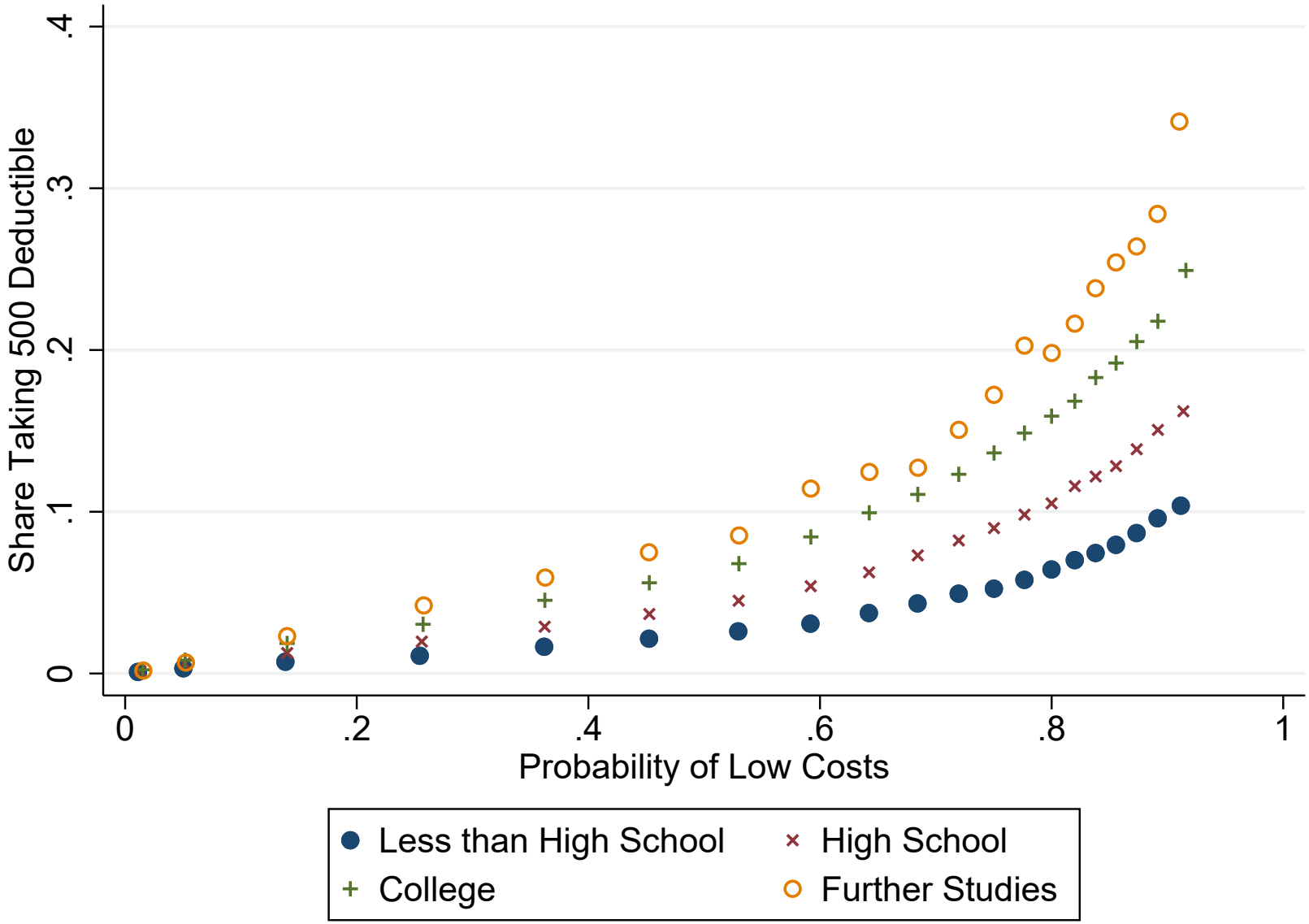
Predicted Probabilities of Low Costs



Optimal vs. Observed Deductible Take-up

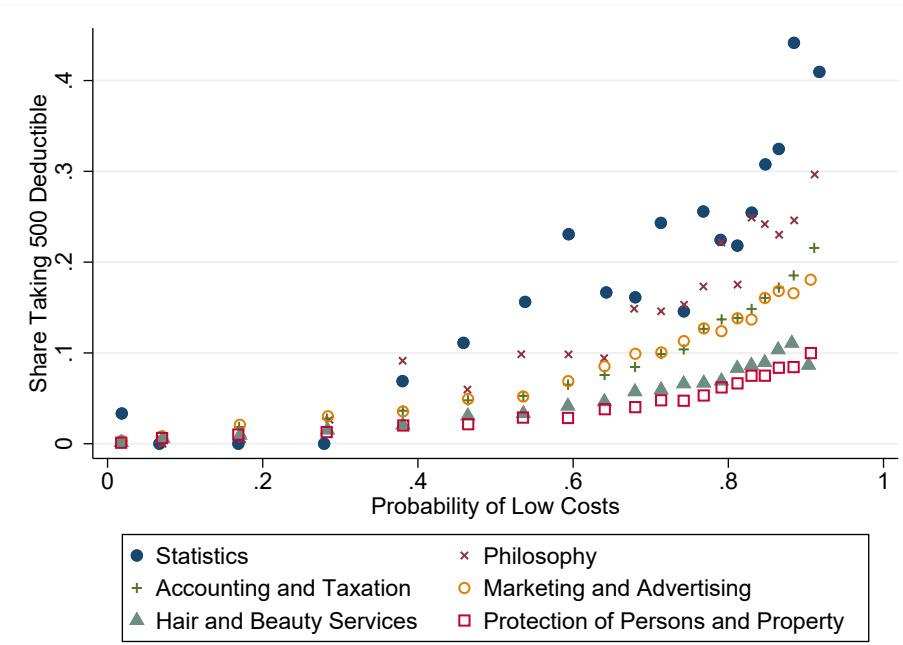


Deductible Take-up by Education

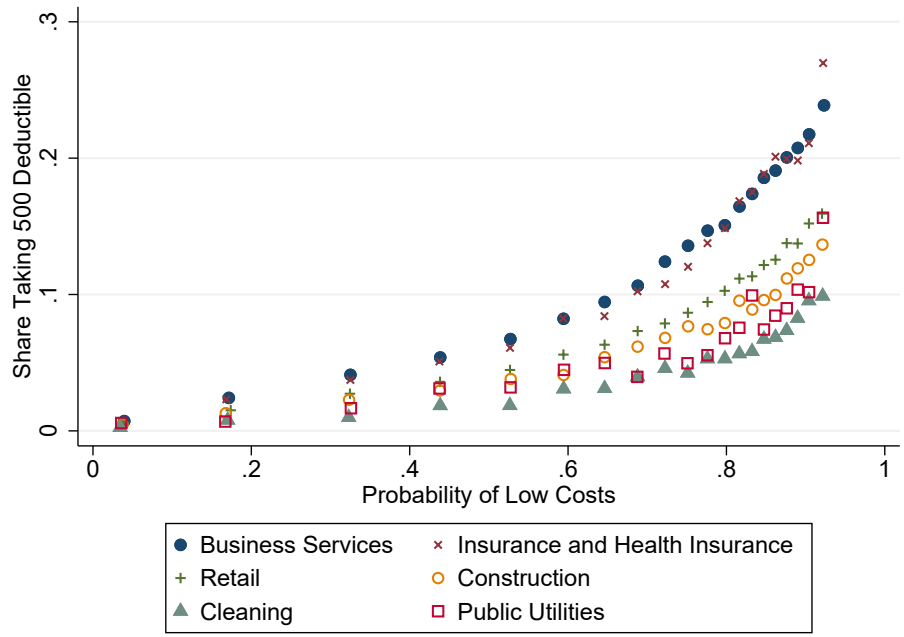


Deductible Take-up by Field of Expertise

A. By Education Field



B. By Professional Sector

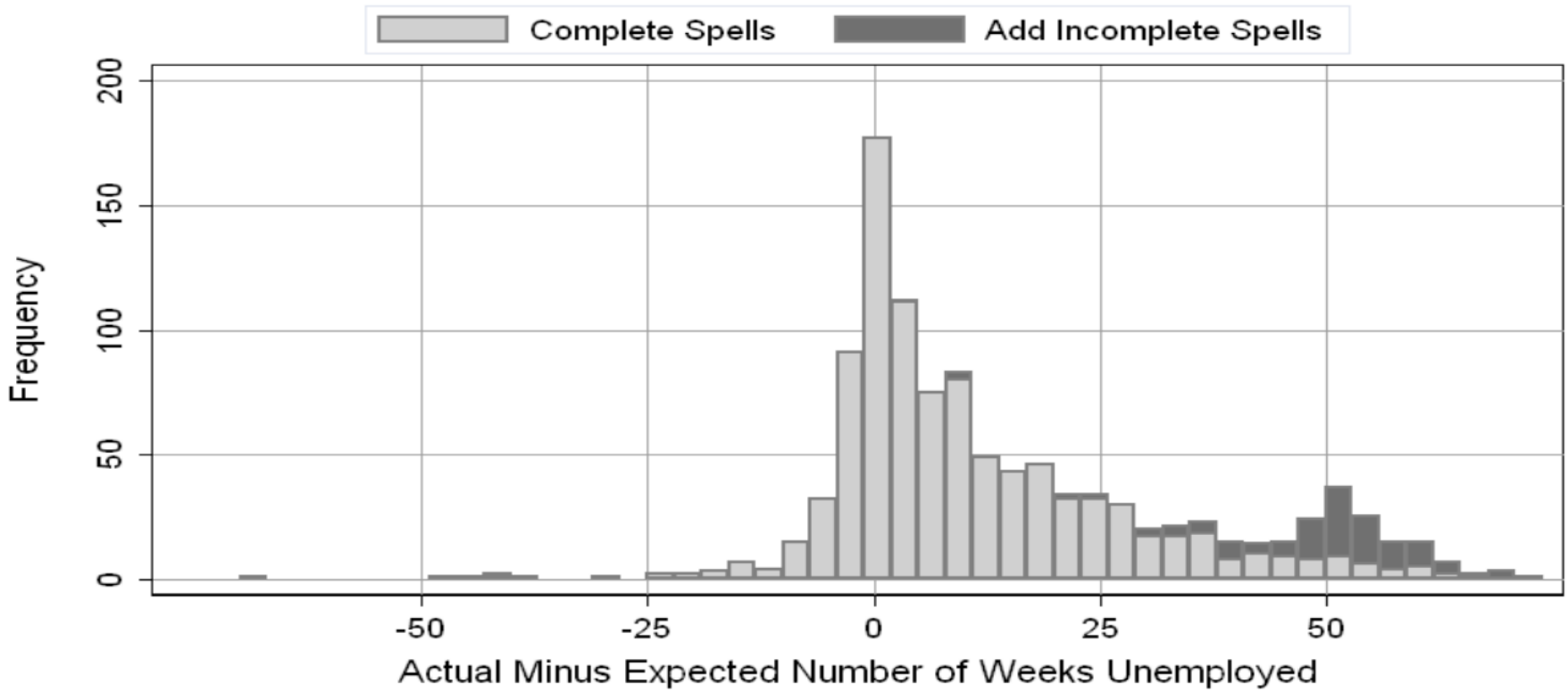


Comparison of Best vs. Worst Decision Makers

	Mean			Over/underrepresentation	
	Top 5% decisionmakers	*Bottom 5% decisionmakers*		*Top 5% decisionmakers*	*Bottom 5% decisionmakers*
Demographics			**Education level**		
Gender (male)	62%	28%	Less than high school	0.30	2.99
Age	36	63	High school	0.82	0.33
Has children	59%	34%	College	3.48	0.00
Has a partner	46%	90%	Further Studies	15.57	0.00
Financials			Unknown	0.08	1.05
Gross income	105,801	39,347	**Education field**		
Net worth	250,632	4,969	Statistics	19.66	0.00
Has Mortgage Debt	64%	19%	Philosophy	13.14	0.00
Has Other Debt	27%	53%	Economics	6.95	0.01
Has Savings >2000EUR	91%	38%	Tax and administration	3.30	0.01
Peer Effects			Marketing and advertising	1.91	0.06
Firm FE decile	6.41	4.09	Hair and beauty services	0.64	1.79
Postcode FE decile	6.07	5.47	Protection of persons	0.38	2.24
Mother With 500 Deductible	37%	0%	**Work Status**		
Father With 500 Deductible	45%	0%	Student	2.80	0.16
			Retired	0.07	2.47
			Self-employed	2.07	0.05
			Employee	1.16	0.31
			On Benefits	0.32	1.94
			Professional sector		
			Business services	2.77	0.09
			Insurance	2.13	0.07
			Retail	1.10	0.34
			Construction	0.75	0.24
			Cleaning	0.26	1.40
			Public utilities	1.51	0.11
Observations					11,369,800

BACKUP: ILLUSTRATIONS OF EMPIRICAL EVIDENCE

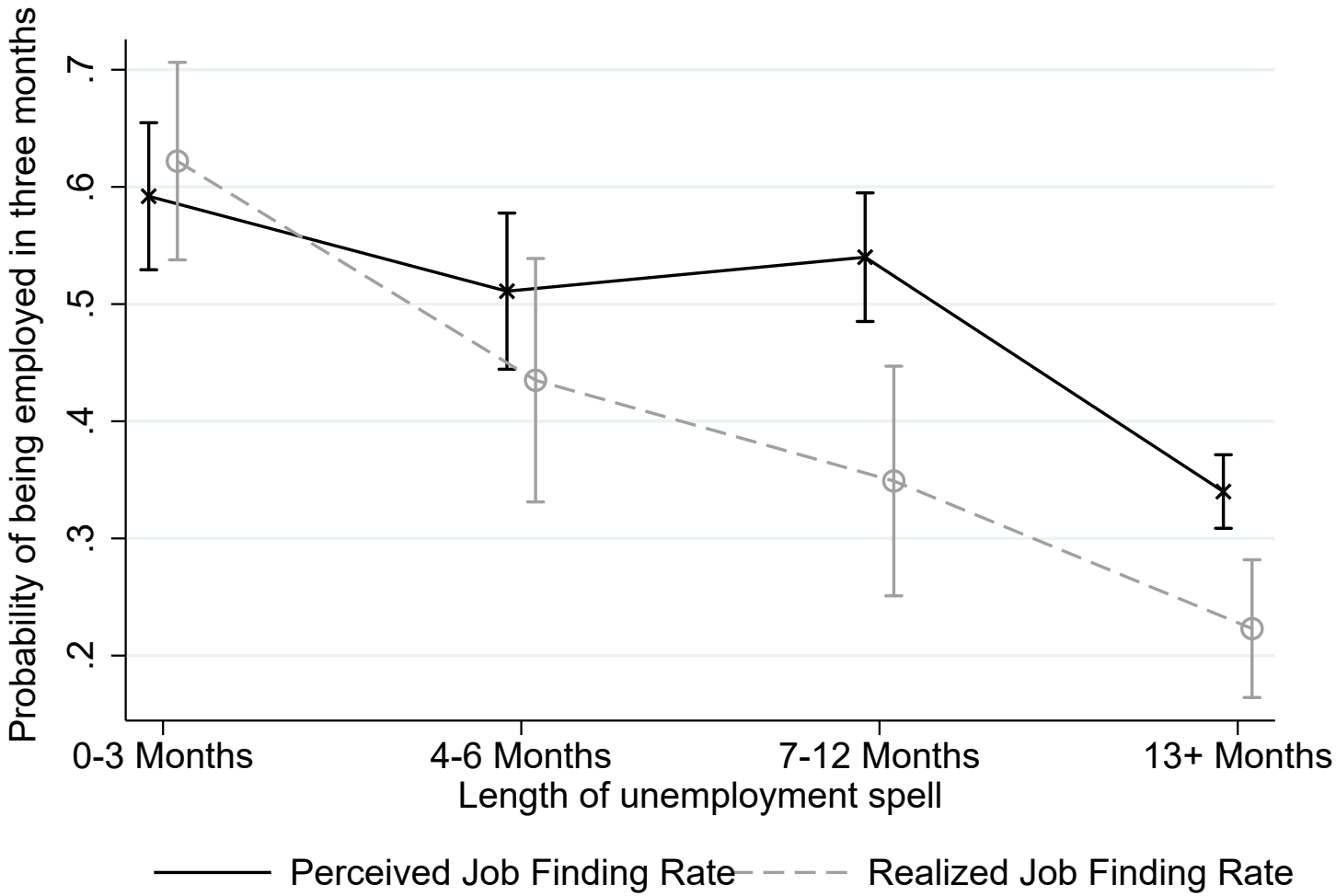
Spinnewijn '15: Optimistic Bias in Beliefs



Back

Mueller et al. '21: Bias for LT unemployed

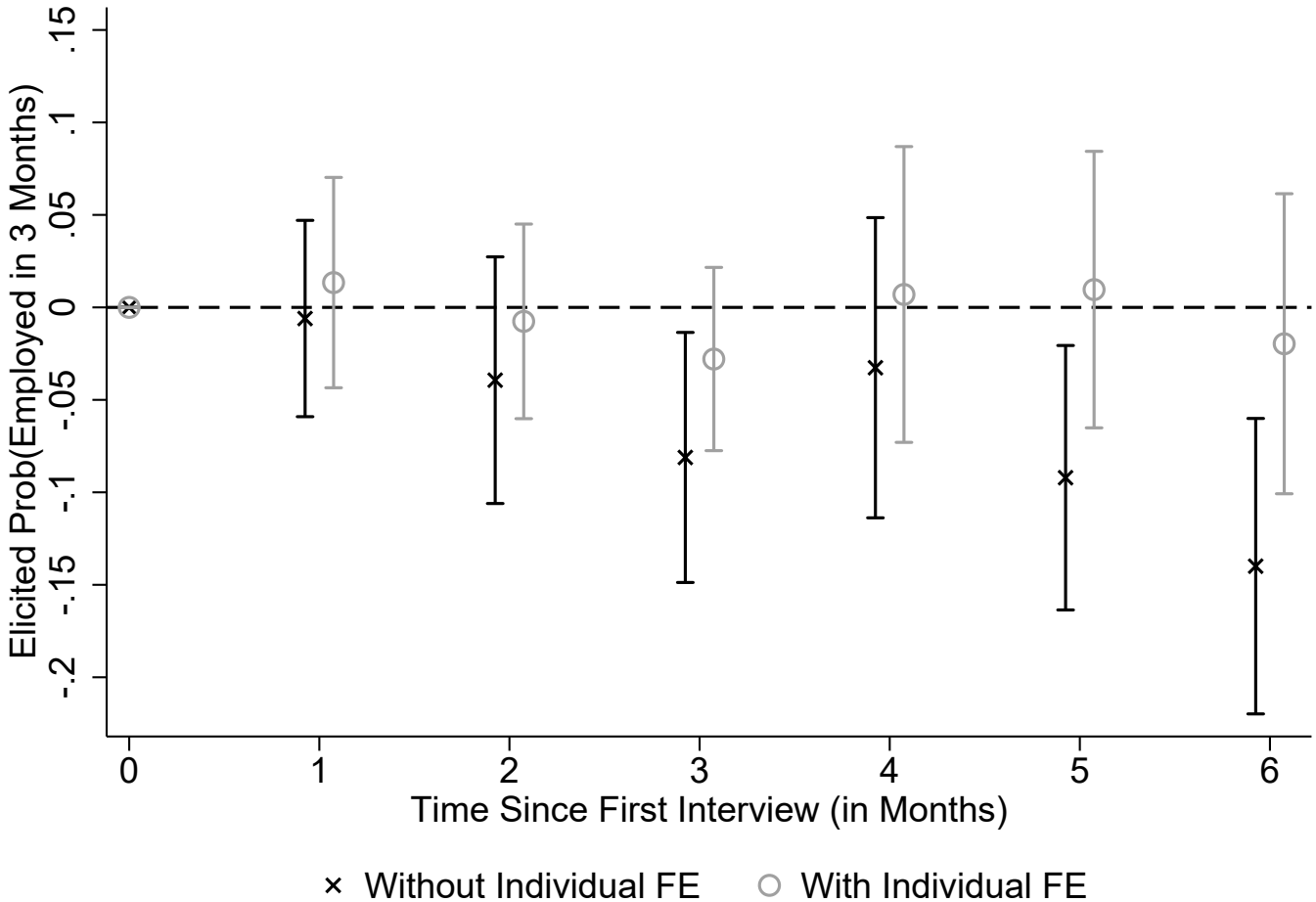
Figure: Perceived vs. True Job Finding by Time Unemployed, SCE Survey



Back

Mueller et al. '21: No Downward Revising

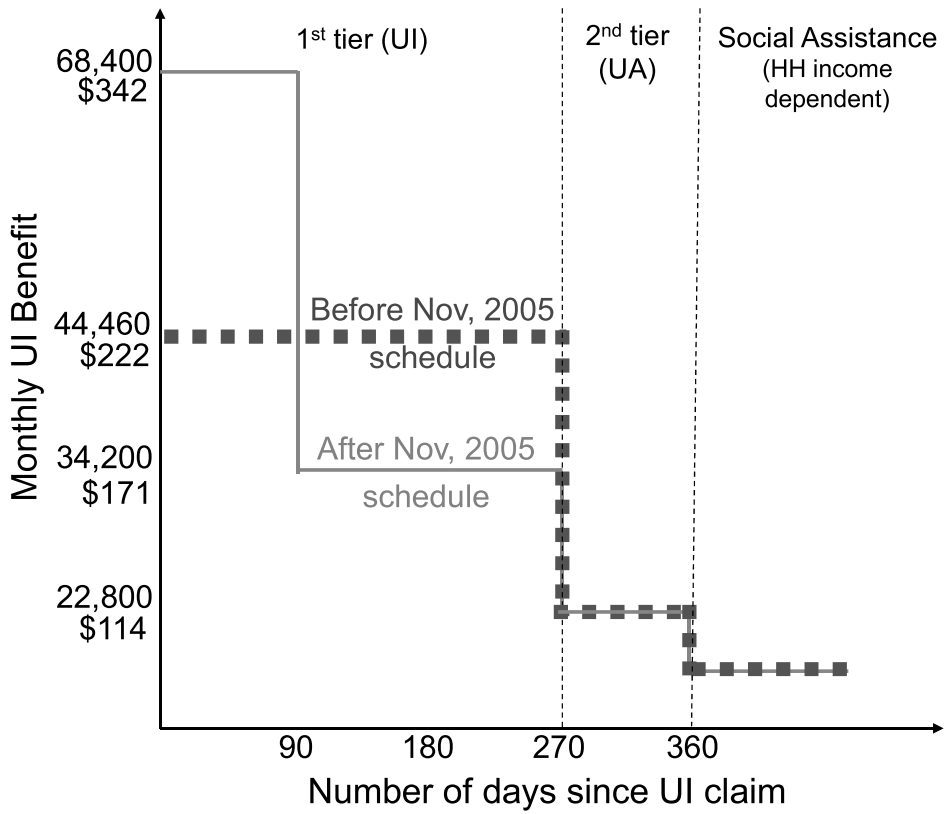
Figure: Perceived Job Finding by Time Unemployed, SCE Survey



Back

DellaVigna et al '17: jumps in UI benefits

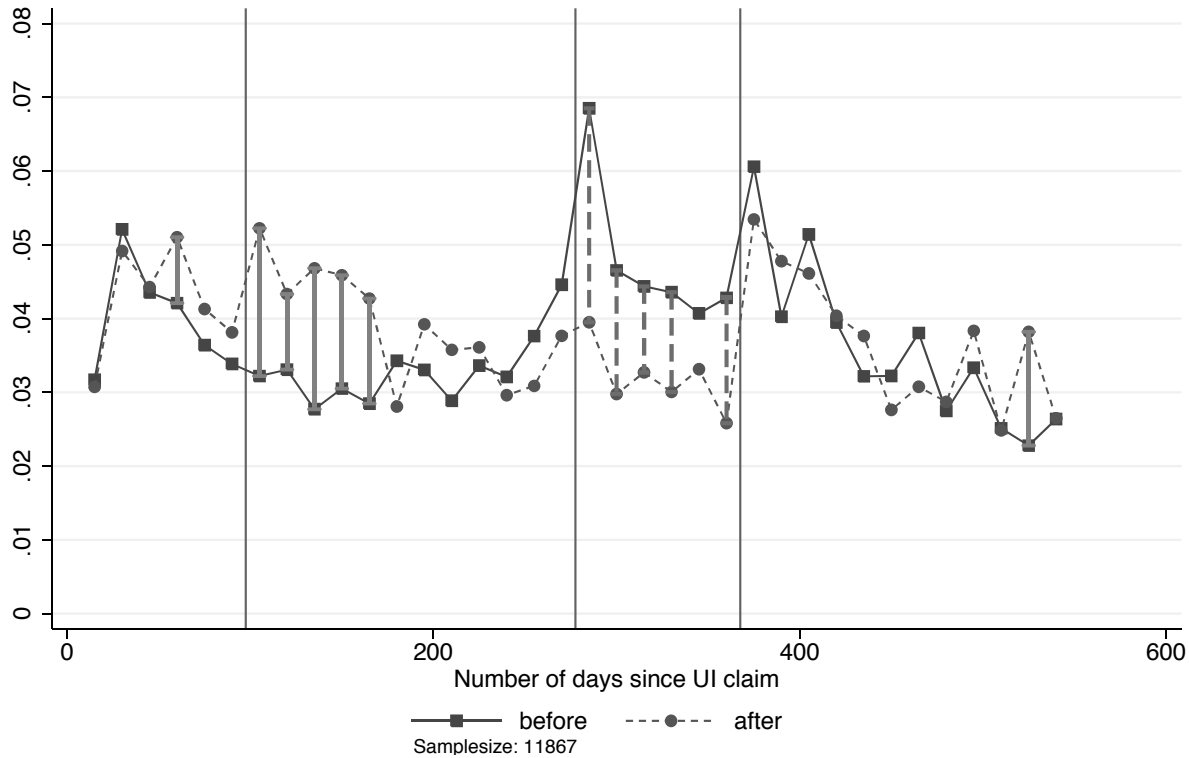
Figure II: Institutional Setting: Change in Benefit Path and Sample Periods



(a) Benefit Path Change, Main Sample

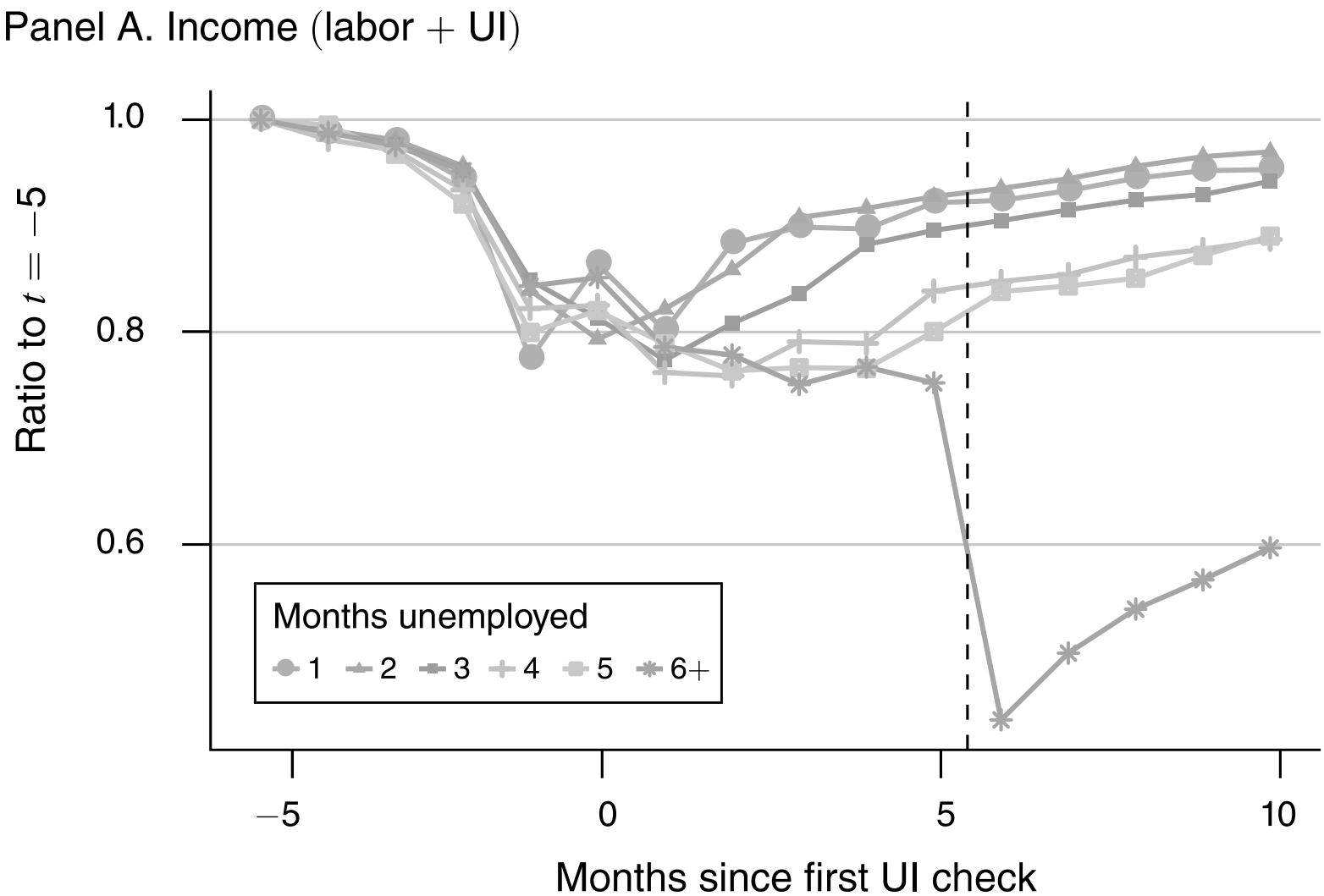
DellaVigna et al '17: spikes in exit rates

Figure III: Empirical Hazard and Survival Rates under the Old and the New Benefit Schedule



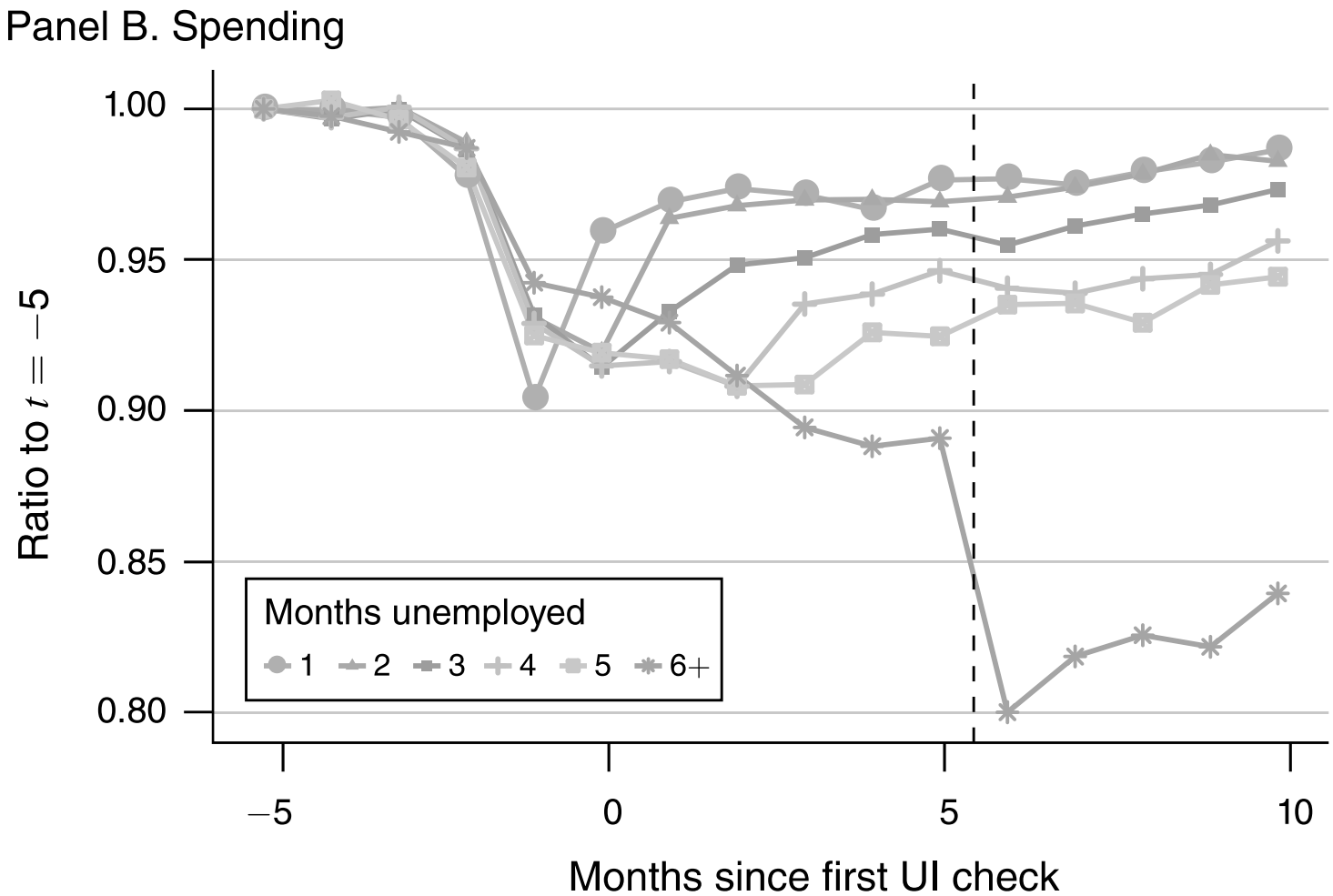
(a) Empirical hazard rates

Ganong & Noel ('19): UI benefit exhaustion



Back

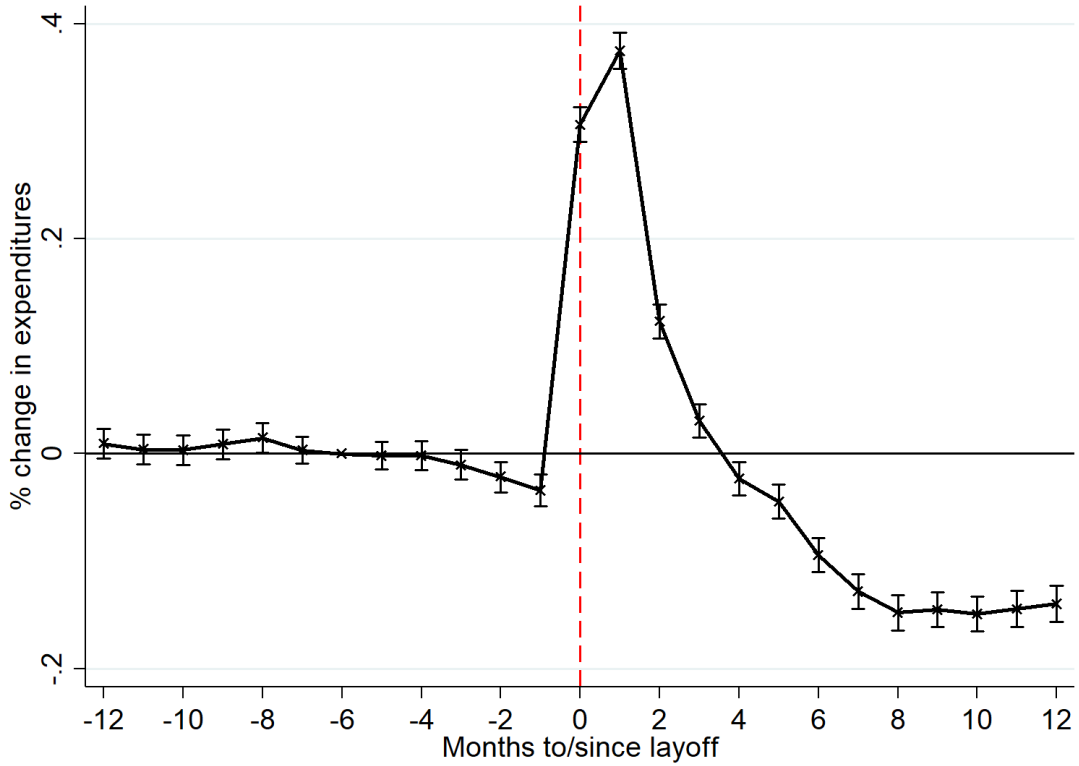
Ganong & Noel ('19): expenditures drop



Back

Gerard & Naritomi ('21): access to liquidity

Figure: Layoff event (unconditional sample, mean effect, total expenditure)



Back