Private Information and Unemployment Insurance

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Private Markets for Job Loss / Unemployment

- Why is there not a robust private market for unemployment/job loss insurance?
  - Like health, life, disability, car, home, pet health, iPhone water damage, etc...
  - Why doesn't Aetna have an unemployment insurance division?
- Large literature studying "optimal" government provision of UI
  - Absence of private market not micro-founded
    - If a private market doesn't exist, doesn't that mean no one's willing to pay for UI?
    - Does providing a microfoundation change the formula for optimal benefits?

Overview of the Paper

- Part 1: Private Information is the reason the private market doesn't exist
  - Use information contained in subjective probability elicitations (Hendren 2013)
  - Quantify cost of adverse selection if contracts were offered:
    - 70% markup (Non-parametric lower bound)
    - 300% markup (Semi-parametric point estimate)

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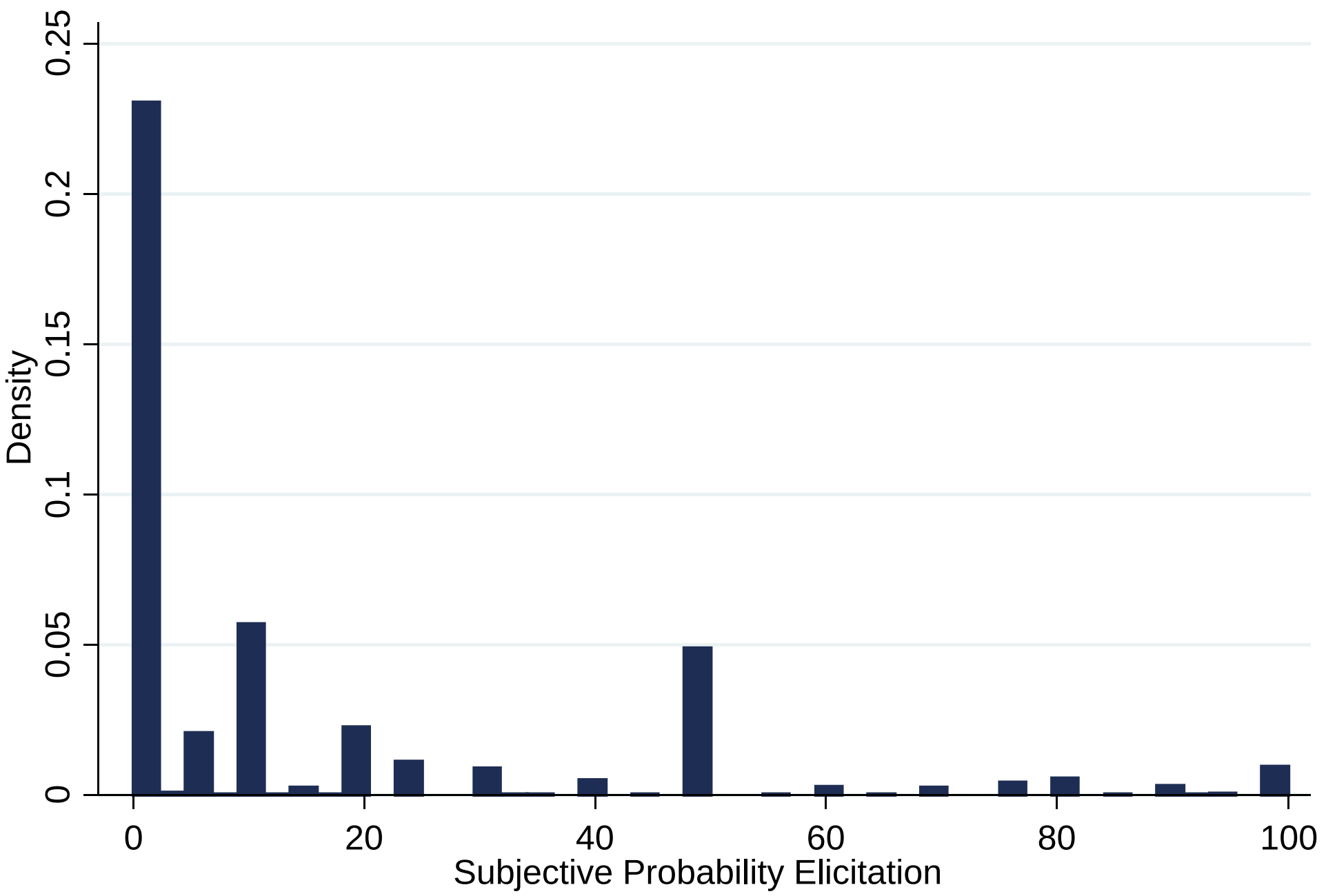
    - 70% markup (Non-parametric lower bound)
    - 300% markup (Semi-parametric point estimate)
- Part 2: Implications for optimal UI policy
  - In response to *potential* job loss, individuals reduce consumption and increase spousal labor supply
    - Causal effect of event on marginal utilities (i.e. Baily formula) no longer sufficient
    - Want insurance against information, not just event
  - Provide new methods to identify ex-ante value of insurance
    - Exploit ex-ante response to information

1. Private Information as Micro-Foundation for Market Non-Existence

2. Optimal UI

Setting and Data

- Use data from Health and Retirement Study (1993-2013)
  - Survey asks subjective probability elicitations, Z
    - *"What is percent chance (0-100) that you will lose your job in the next 12 months?"*


Histogram of Subjective Probability Elicitations
Density
0
0.05
0.1
0.15
0.2
0.25
0
20
40
60
80
100
Subjective Probability Elicitation

Elicitations as Noisy Measures of Beliefs

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  - Start with controls for demographics + job characteristics
    - Demographics (gender, age quadratic, census division, year)
    - Job characteristics (tenure quadratic, occupation dummies, industry dummies, log wage quadratic)
    - Add additional controls for health, unemployment history, etc.

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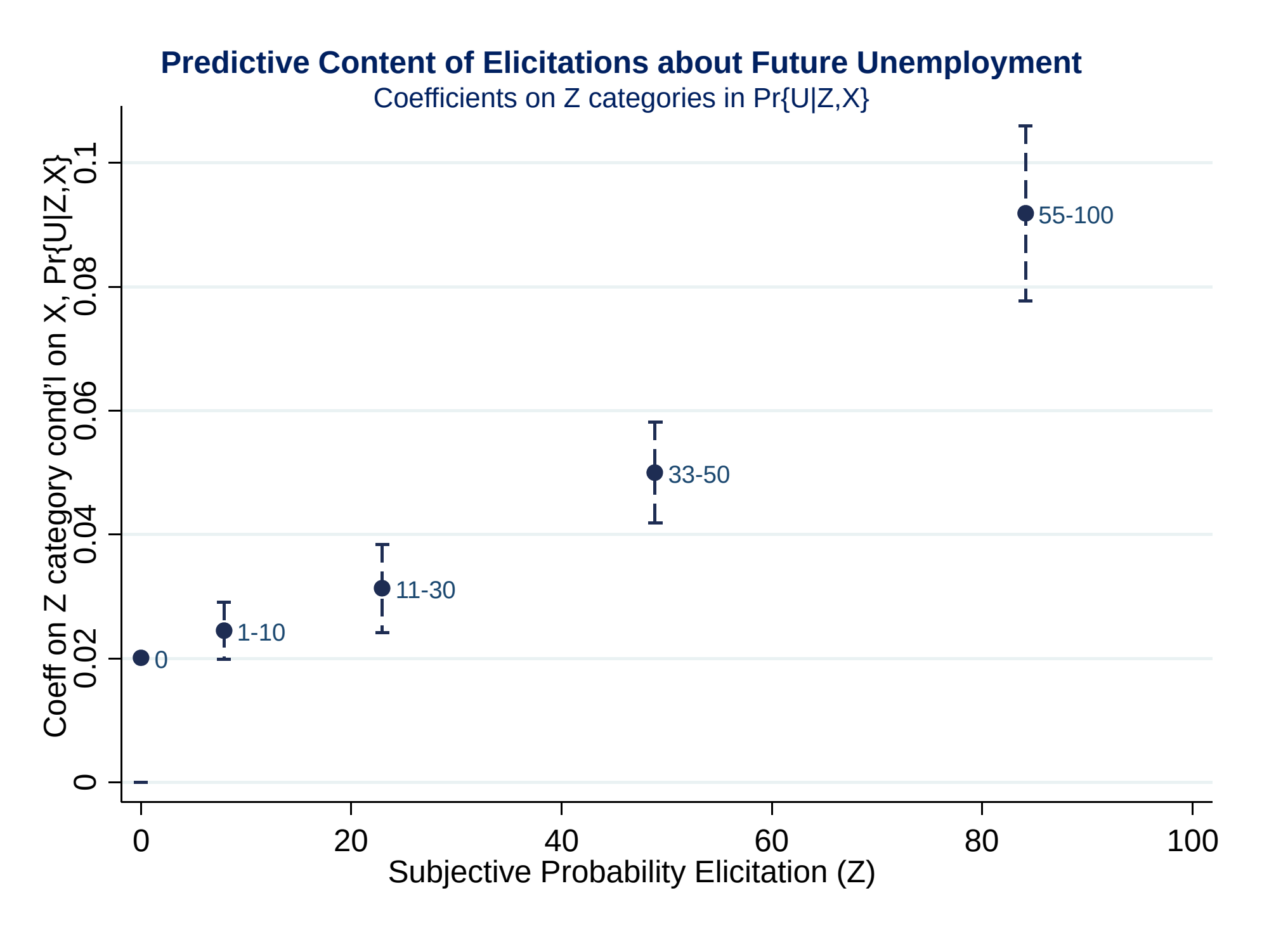
    - Add additional controls for health, unemployment history, etc.
- Bin Z into groups, χ_j, (0, 1-10, ...)
  - Regress U on X and bins to construct:

$$P_Z = \Pr\{U|X, Z\} = \beta X + \sum_j \zeta_j 1\{Z \in \chi_j\}$$


Predictive Content of Elicitations about Future Unemployment
Coefficients on Z categories in Pr{U|Z,X}
Coeff on Z category cond'l on X, Pr{U|Z,X}
0
0.02
0.04
0.06
0.08
0.1
0
1-10
11-30
33-50
55-100
0
20
40
60
80
100
Subjective Probability Elicitation (Z)

Quantifying Private Information

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  - When can one provide insurance that pays \$1 if U occurs?

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- Key statistic: Pooled price ratio, $T(P)$
  - How much of a markup would you have to be willing to pay to cover the pooled cost of worse risks?

Quantifying Private Information

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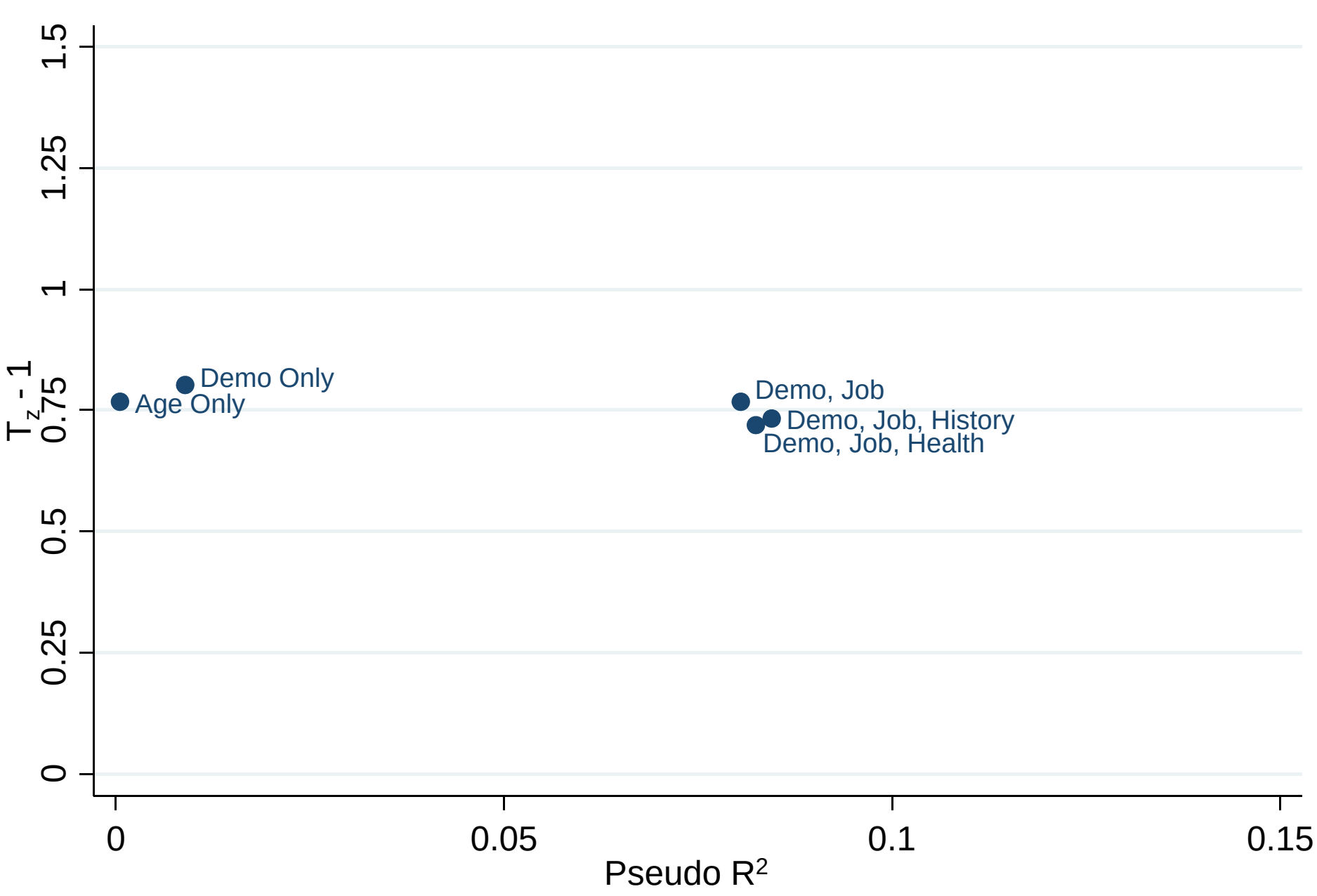
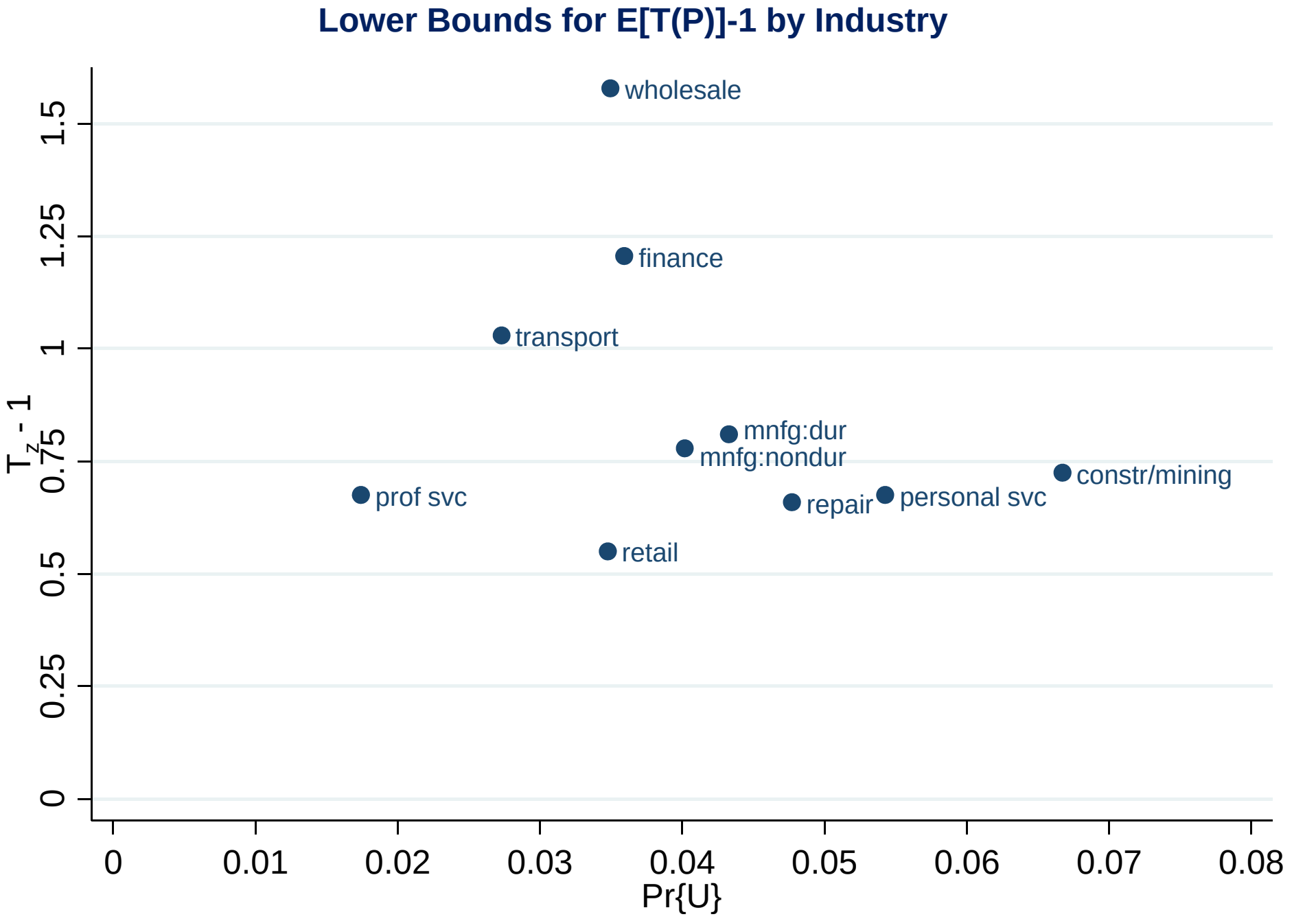
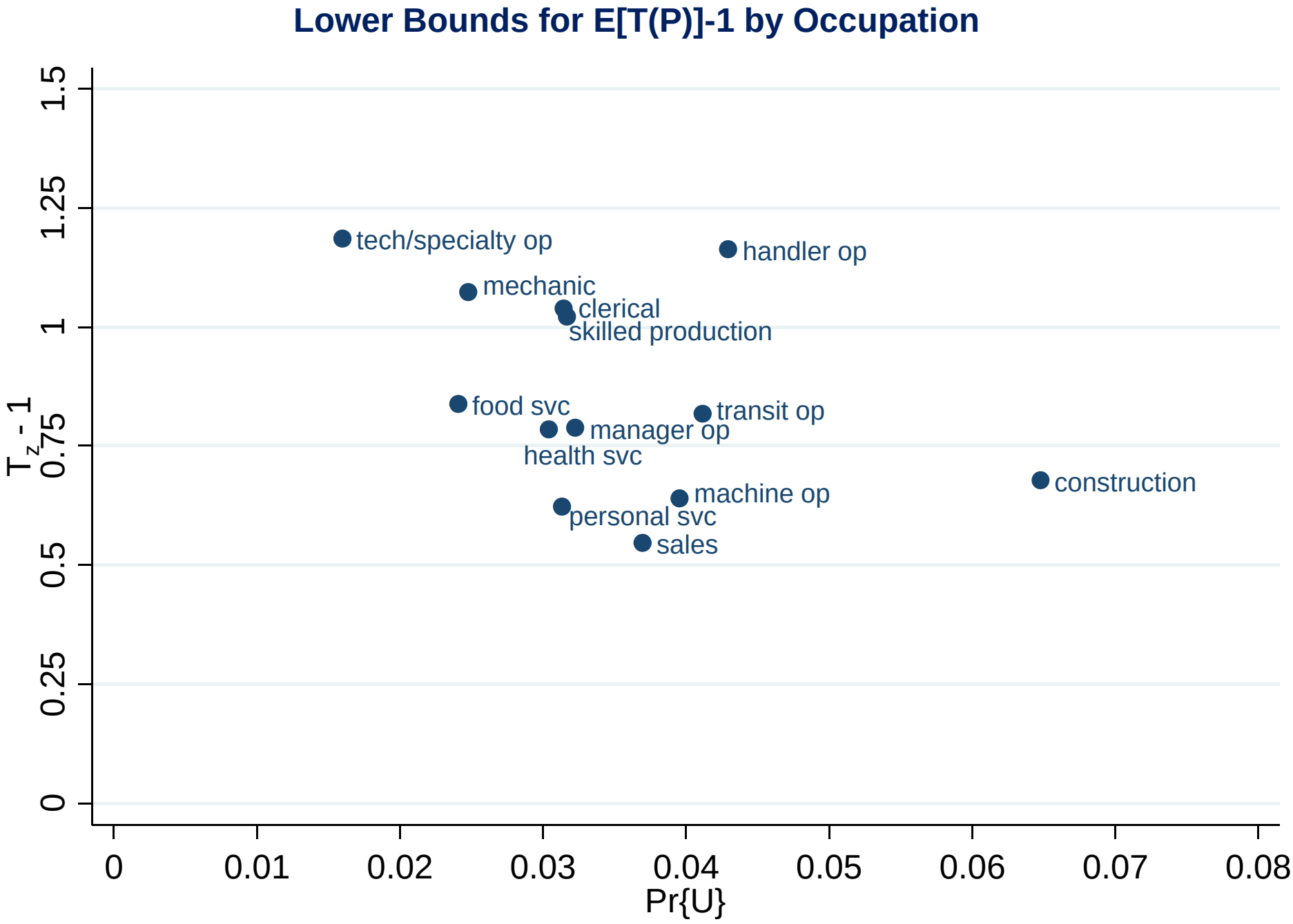
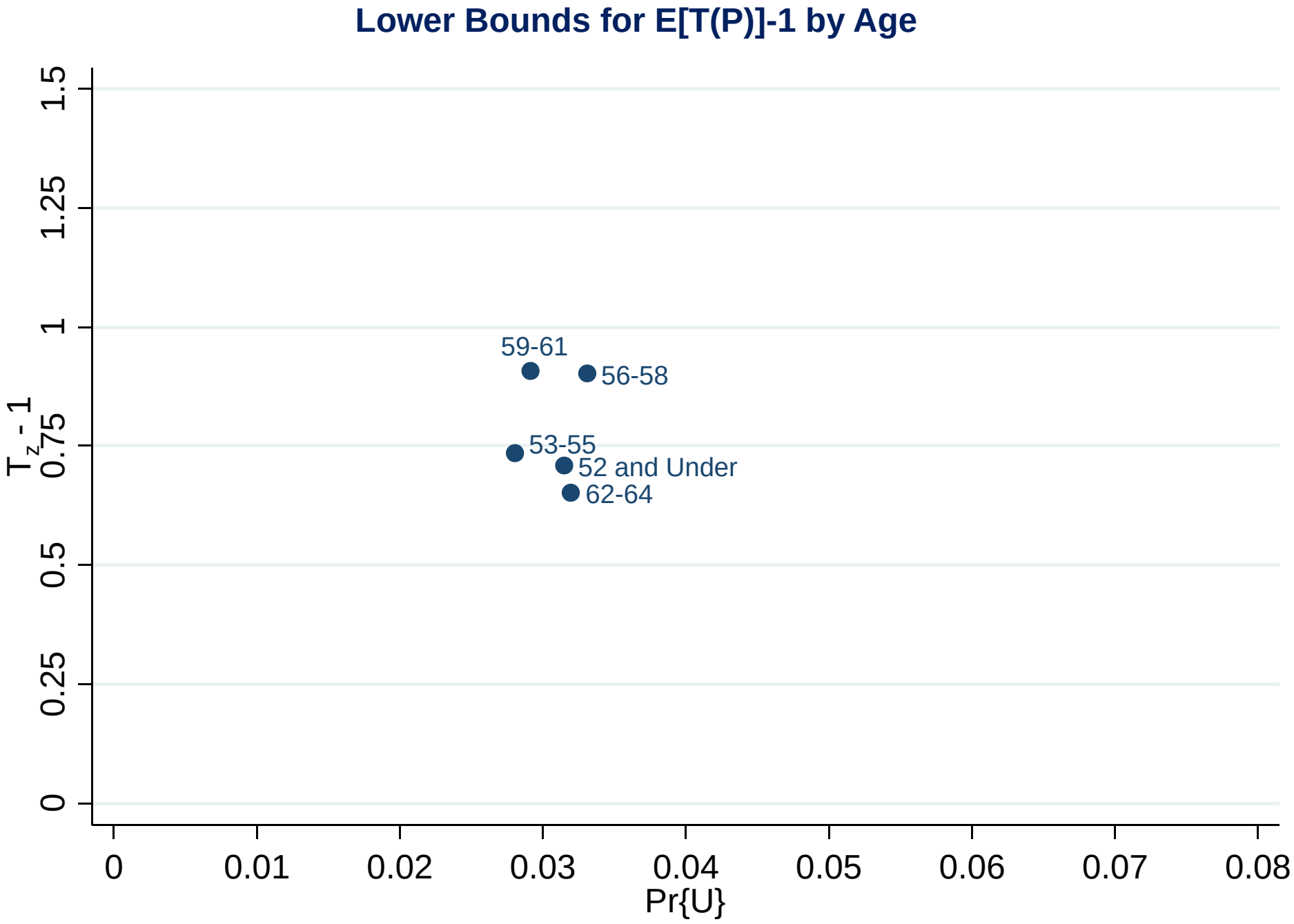
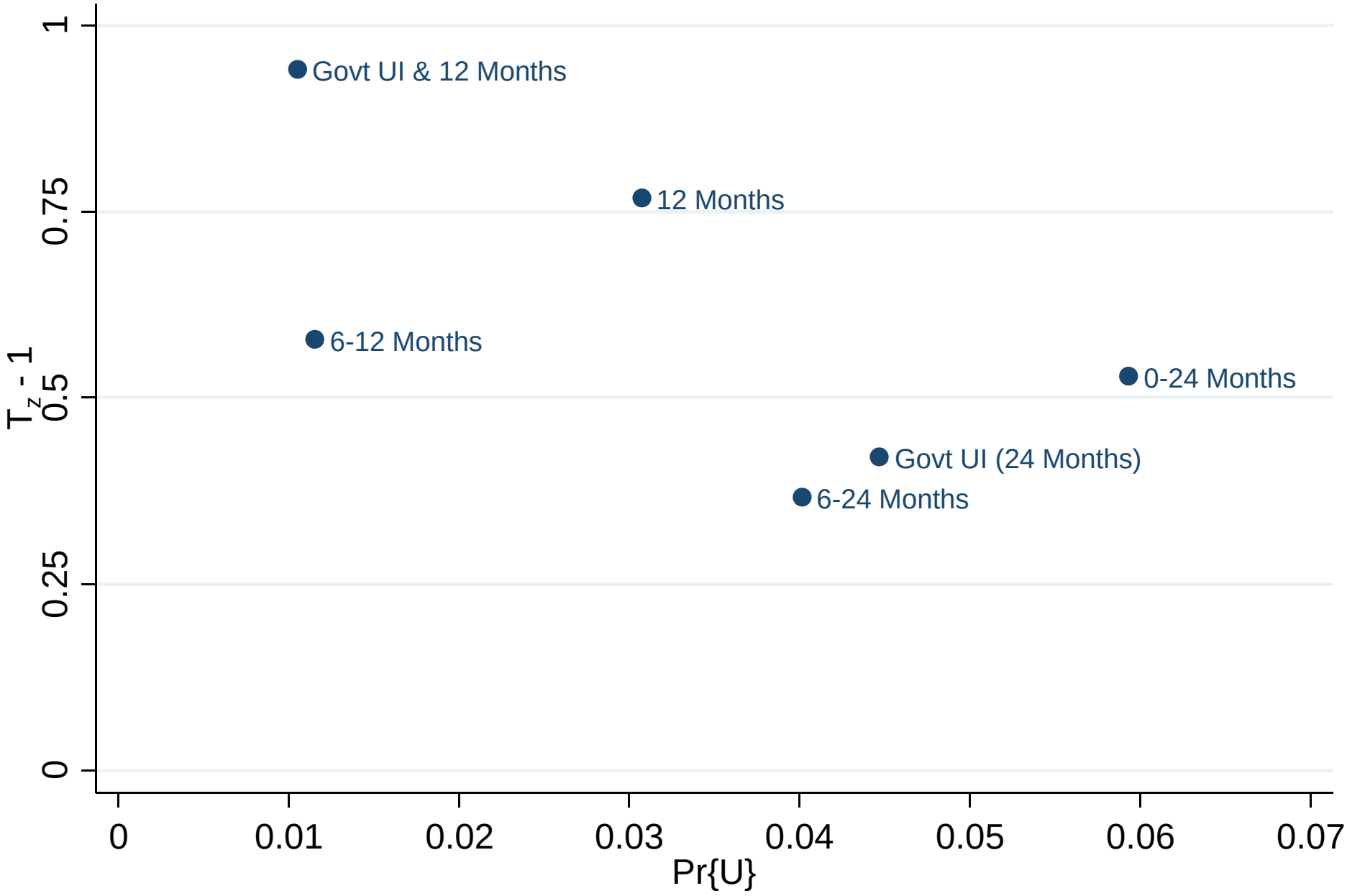
  - When can one provide insurance that pays \$1 if U occurs?
- Key statistic: Pooled price ratio, $T(P)$
  - How much of a markup would you have to be willing to pay to cover the pooled cost of worse risks?
- Can use distribution of predicted values to provide non-parametric lower bound on this markup
  - Without any assumptions about elicitation error
  - Need elicitations to be not more informative than true beliefs
  - Need true beliefs (not elicitations) to be unbiased

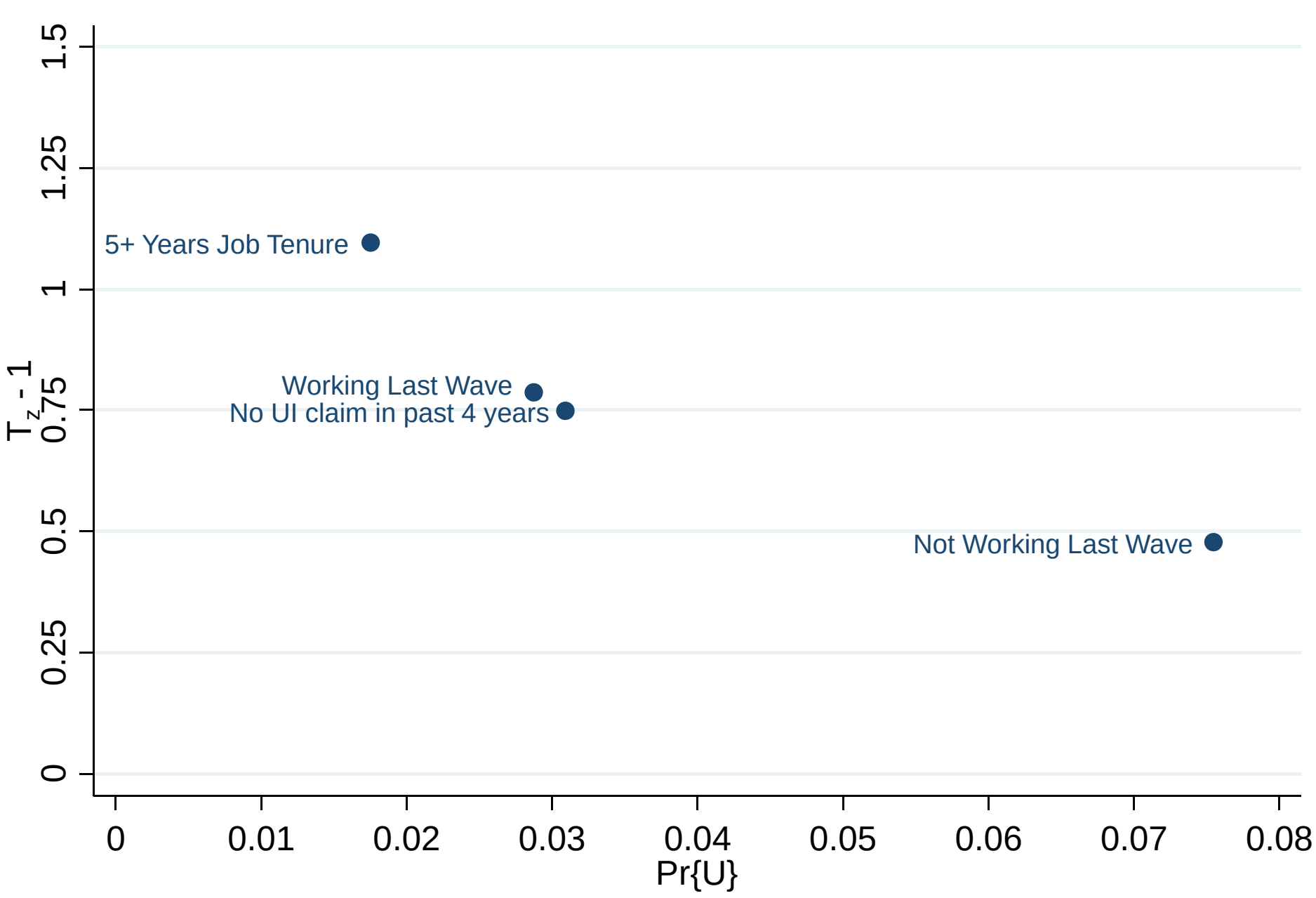

Lower Bounds for E[T(P)]-1 using Alternative Controls
T_z - 1
0
0.25
0.5
0.75
1
1.25
1.5
Demo Only
Age Only
Demo, Job
Demo, Job, History
Demo, Job, Health
0
0.05
0.1
0.15
Pseudo R^2


Lower Bounds for E[T(P)]-1 by Industry
wholesale
finance
transport
mnfg:dur
mnfg:nondur
constr/mining
prof svc
repair
personal svc
retail
T_z - 1
0
0.25
0.5
0.75
1
1.25
1.5
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}


Lower Bounds for E[T(P)]-1 by Occupation
1.5
1.25
1
0.75
0.5
0.25
0
T_z - 1
tech/specialty op
handler op
mechanic
clerical
skilled production
food svc
transit op
manager op
health svc
construction
machine op
personal svc
sales
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}


Lower Bounds for E[T(P)]-1 by Age
1.5
1.25
1
0.75
0.5
0.25
0
T_z - 1
59-61
56-58
53-55
52 and Under
62-64
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}


Lower Bounds on E[T(P)]-1 using Alternative U Definitions
Govt UI & 12 Months
12 Months
6-12 Months
0-24 Months
Govt UI (24 Months)
6-24 Months
T_z - 1
0
0.25
0.5
0.75
1
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Pr{U}

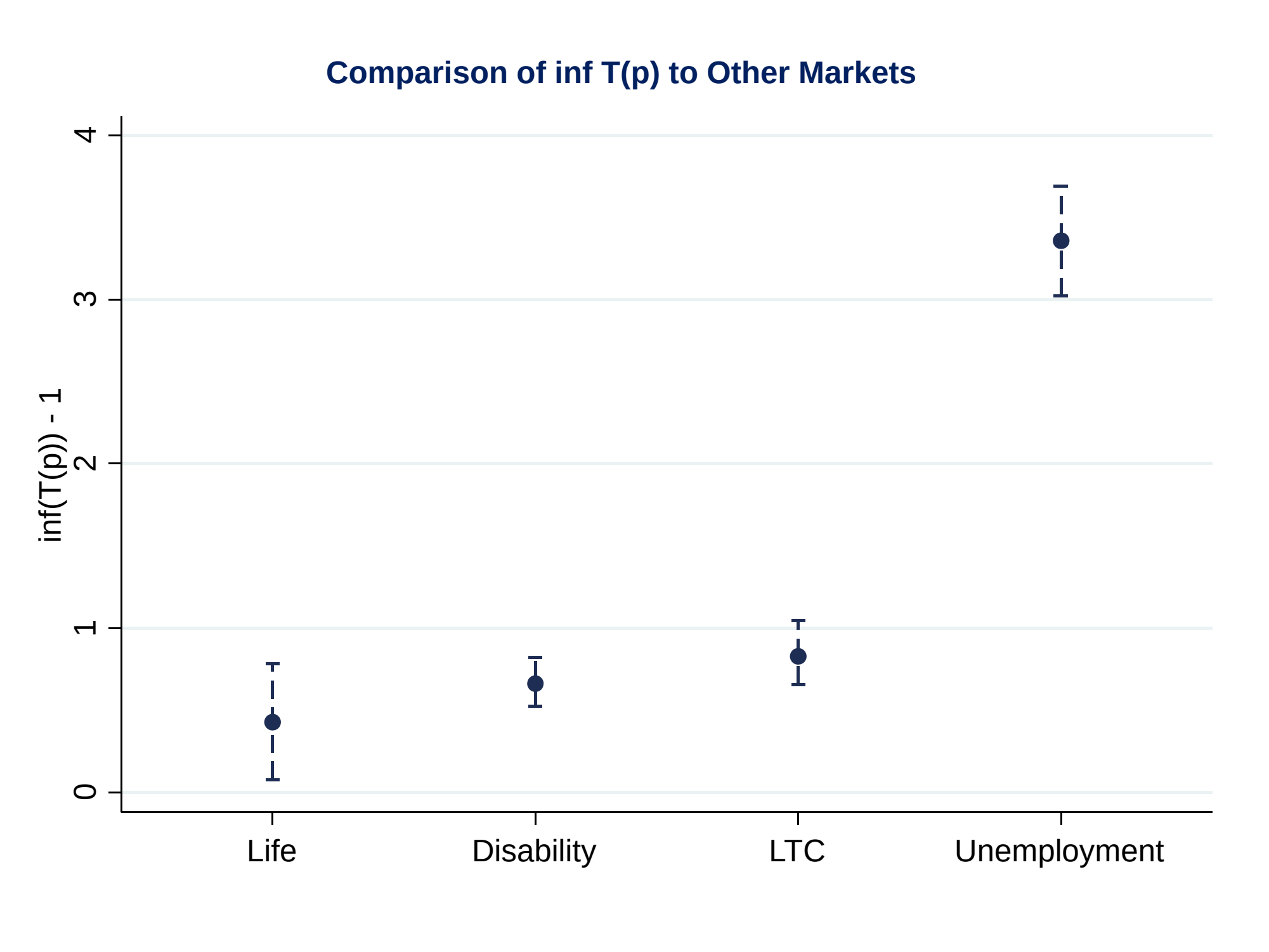

Lower Bounds for E[T(P)]-1 for Low Risk Sub-samples
1.5
1.25
1
0.75
0.5
0.25
0
T_z - 1
5+ Years Job Tenure
Working Last Wave
No UI claim in past 4 years
Not Working Last Wave
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}

Minimum Pooled Price Ratio

Specification	Baseline	Alternative Controls	
		Demo	Health
	(1)	(2)	(3)
Inf T(p) - 1	**3.360**	**5.301**	**3.228**
s.e.	**(0.203)**	**(0.655)**	**(0.268)**
Controls			
Demographics	X	X	X
Job Characteristics	X		X
Health Characteristics			X
Num of Obs.	26,640	26,640	22,831
Num of HHs	3,467	3,467	3,180

Minimum Pooled Price Ratio

Specification	Sub-Samples					
	Age <= 55	Age > 55	Below Median Wage	Above Median Wage	Tenure > 5 yrs	Tenure <= 5 yrs
Inf T(p) - 1	**3.325**	**3.442**	**4.217**	**3.223**	**4.736**	**3.739**
s.e.	**(0.306)**	**(0.279)**	**(0.417)**	**(0.268)**	**(0.392)**	**(0.336)**
Controls						
Demographics	X	X	X	X	X	X
Job Characteristics	X	X	X	X	X	X
Num of Obs.	11,134	15,506	13,320	13,320	17,850	8,790
Num of HHs	2,255	3,231	2,916	2,259	2,952	2,437


Comparison of inf T(p) to Other Markets
inf(T(p)) - 1
0
1
2
3
4
Life
Disability
LTC
Unemployment

1 Private Information as Micro-Foundation for Market Non-Existence

2 Optimal UI

Implications for Optimal UI

- What is the utilitarian-optimal level of benefits?

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- Baily-Chetty formula starting point:

$$\frac{u'(c_u) - v'(c_e)}{v'(c_e)} = FE$$

  - Effect of unemployment on marginal utilities of income characterizes WTP for insurance
  - Compare to total costs, inclusive of fiscal externality

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- If individuals learn before the event, can partially mitigate impact (e.g. $v' = u'$)
  - Causal effect of event on marginal utilities, i.e. $u'(c_u) - v'(c_e)$, not sufficient
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  - Causal effect of event on marginal utilities, i.e. $u'(c_u) - v'(c_e)$, not sufficient
  - Conflates uncertainty realization with event realization
    - Raises both theoretical and empirical issues

Implications for Theory

- Let p denote probability of unemployment
- Optimality formula:

$$W = \frac{E\left[\frac{p}{E[p]}u'\left(c_u\left(p\right)\right)\right] - E\left[\frac{1-p}{E[1-p]}v'\left(c_e\left(p\right)\right)\right]}{E\left[\frac{1-p}{E[1-p]}v'\left(c_e\left(p\right)\right)\right]} = FE$$

  where W is the ex-ante markup individuals are willing to pay
  - FE remains the aggregate fiscal externality from increasing benefits
- Causal effect of U on marginal utilities works for those with $p = E\left[p\right]$
  - Differs from canonical formula if marginal utilities of income vary with p
    - Higher if high p -> high marginal utilities (in either state)

Theoretical and Implementation Issues

- Empirical issues
  - Common to look at 1-year consumption changes to measure $\frac{u'-v'}{v'} \approx \sigma \frac{\Delta c}{c}$
  - Euler equation

$$v'\left(c_{pre}\left(p\right)\right) = pu'\left(c_u\left(p\right)\right) + \left(1-p\right)v'\left(c_e\left(p\right)\right)$$

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- What is the value of insurance to those who learned p ex-ante?

The Value of Insurance to the Informed

- Consider welfare experiment:

$$\begin{aligned} W^{ex-ante} &= \frac{v'\left(c_{pre}\left(1\right)\right) - v'\left(c_{pre}\left(0\right)\right)}{v'\left(c_{pre}\left(0\right)\right)} \\ &\approx \frac{\frac{d}{dp}v'}{v'} \approx \frac{dlog\left(v'\right)}{dp} \end{aligned}$$

Note $W^{ex-ante} \approx W$ if ex-post consumption response is small

- Captures welfare impact on those not captured in previous literature

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$$\frac{dlog\left(v'\right)}{dp} \approx \sigma_v \frac{dlog\left(c_{pre}\right)}{dp}$$

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- Consumption

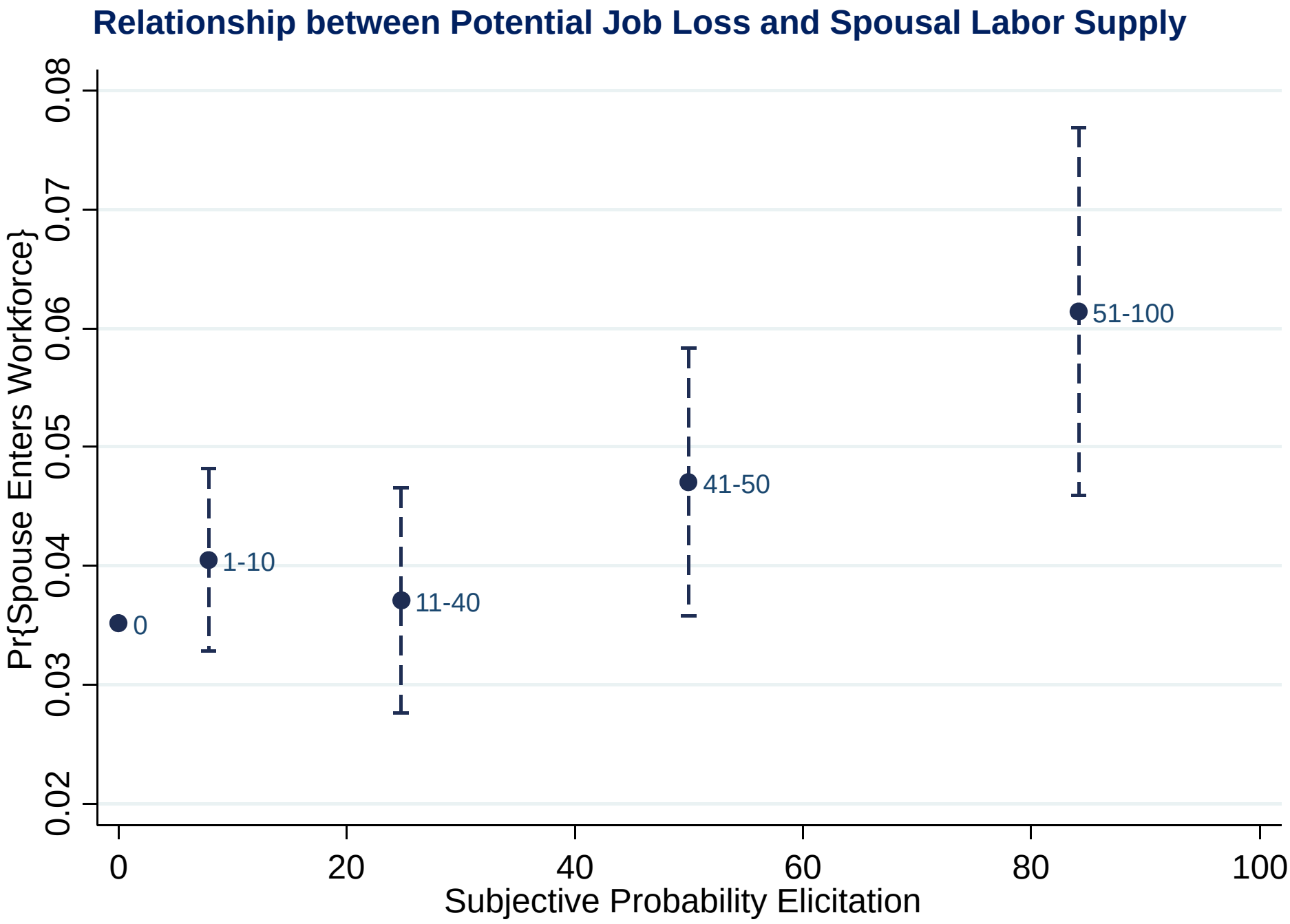
$$\frac{dlog\left(v'\right)}{dp} \approx \sigma_v \frac{dlog\left(c_{pre}\right)}{dp}$$

- Spousal extensive margin labor supply

$$\frac{dlog\left(v'\right)}{dp} \approx \frac{1}{\epsilon^{semi}} \frac{d\left[LFP^{Spouse}\right]}{dp}$$

Spousal Labor Supply Response

- Sample of households who stay married in $t-1$ and t
- Focus on labor market entry
- Define an indicator for a spouse not in labor force last period and in labor force this period
  - On average, about 4% of spouses go from not working to working
  - Paper also looks at exit
    - Evidence of correlated shocks on exit
    - Suggests current approach may under-state response if opportunity set held fixed


Relationship between Potential Job Loss and Spousal Labor Supply
Pr{Spouse Enters Workforce}
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
Subjective Probability Elicitation
0
1-10
11-40
41-50
51-100

Welfare Calculation: Spousal Labor Supply Response

Specification:	Baseline	U=0	HH FE	Ind FE	2yr Lag ("Placebo")
Estimation of dL/dZ					
Elicitation (Z)	0.0273**	0.0270**	0.0267*	0.0312	0.00792
s.e.	(0.0112)	(0.0116)	(0.0146)	(0.0230)	(0.0102)
Mean Dep Var	0.04	0.04	0.04	0.04	0.04
Num of Obs.	11049	10726	11049	11049	11049
Num of HHs	2214	2194	2214	2214	2214

Translating to Welfare

- Assume $\epsilon^{semi} = 0.5$

Translating to Welfare

- Assume $\epsilon^{semi} = 0.5$
- Need to correct for measurement error in Z

$$\frac{dLFP}{dP} = \frac{dLFP}{dZ}\frac{var\left(Z\right)}{var\left(P\right)}$$

  - Again, use information in the joint distribution of Z and L

$$var\left(P\right) \approx cov\left(L, Z\right)$$

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s.e.	(0.0112)	(0.0116)	(0.0146)	(0.0230)	(0.0102)
Welfare Calculation					
Total/Signal Var	11.00	11.00	11.00	11.00	
bootstrap s.e.	(1.41)	(1.37)	(1.32)	(1.32)	
Implied WTP ($\varepsilon^{semi} = 0.5$)	0.6**	0.59**	0.59**	0.69*	
bootstrap s.e.	(0.26)	(0.26)	(0.29)	(0.39)	
Mean Dep Var	0.04	0.04	0.04	0.04	0.04
Num of Obs.	11049	10726	11049	11049	11049
Num of HHs	2214	2194	2214	2214	2214

Consumption Behavior

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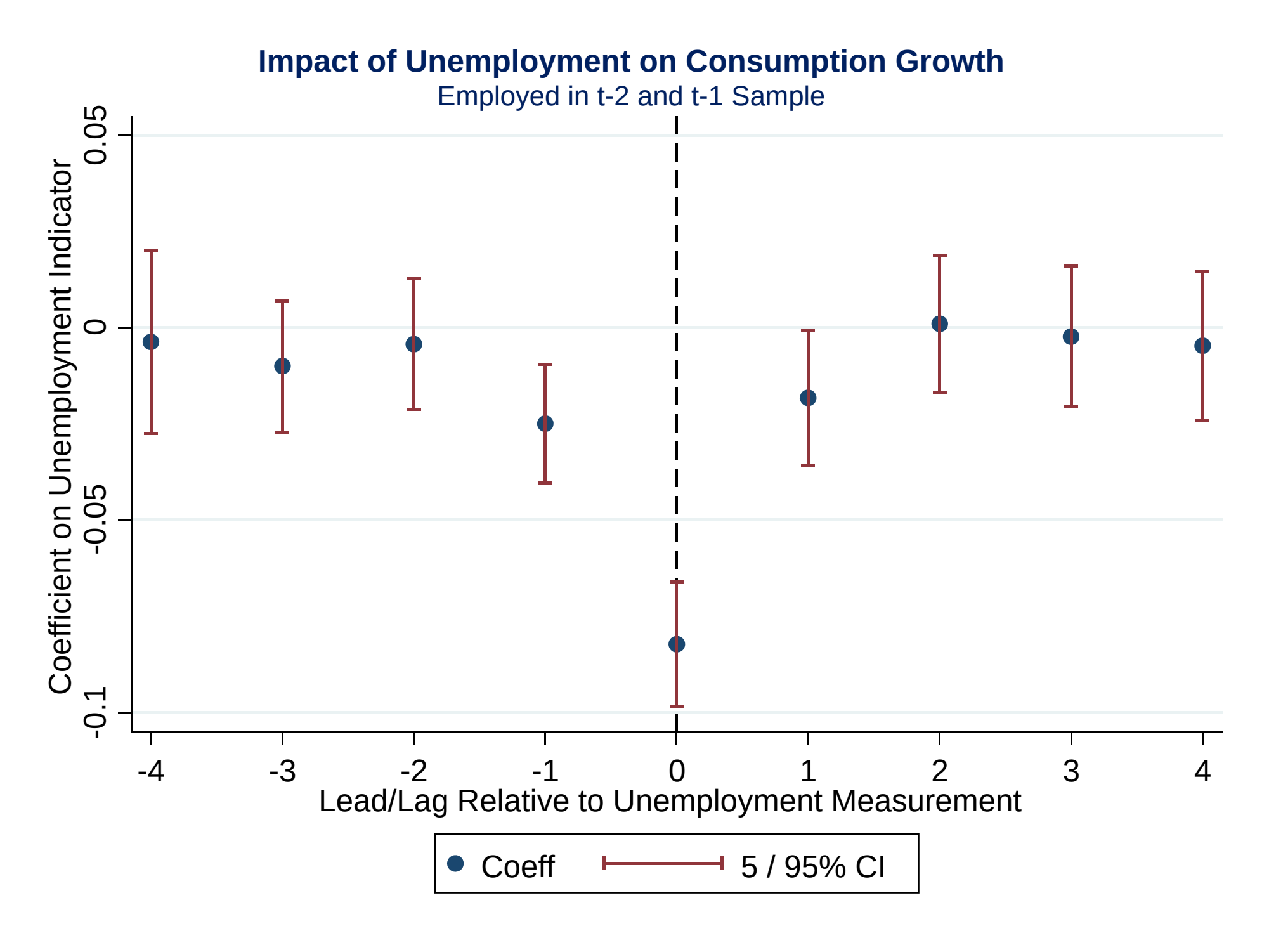
- Problem: Don't observe consumption and elicitation at same time in HRS
- Solution: 2-sample IV
  - Evolution of beliefs in HRS
  - Evolution of food consumption in PSID (Gruber 1997, Stephens (2001), Chetty and Szeidl (2007), ...)

Consumption Behavior: PSID

- Follow data construction in Gruber (1997) and Chetty and Szeidl (2007)
  - Restrict to heads of household
  - Measure food expenditure as in + out + stamps
- Define consumption growth $g_t = log\left(c_t\right) - log\left(c_{t-1}\right)$
  - Regress g_{t-1} on U_t + controls (age cubic, year dummies)
  - Restrict the sample to those not unemployed in $t-2$ and $t-1$


Impact of Unemployment on Consumption Growth
Employed in t-2 and t-1 Sample
Coefficient on Unemployment Indicator
0.05
0
-0.05
-0.1
-4
-3
-2
-1
0
1
2
3
4
Lead/Lag Relative to Unemployment Measurement
Coeff
5 / 95% CI

Impact of Future Job Loss on Consumption

Specification:	Full Sample	Employed t-2 and t-1	Controls for Needs	Fixed Effects	Over 40 Sample	(2) With Outliers
	(1)	(2)	(3)	(4)	(5)	(6)
Impact of Unemployment on $log(c_{t-2})$-$log(c_{t-1})$						
Unemp	-0.0336***	-0.0250***	-0.0264***	-0.0243*	-0.0262*	-0.0231*
s.e.	(0.00570)	(0.00942)	(0.0102)	(0.0133)	(0.0157)	(0.0121)
Specification Details						
Sample Employed in t-2 and t-1		X	X	X	X	X
Controls for change in log needs (t-2 vs t-1)			X	X	X	
Individual Fixed Effects				X		
Num of HHs	11055	10042	8869	8869	4772	10156

Scaling by the "First Stage" of Information Revelation

- Reduced form

$$\Delta^{RF} = 0.025$$

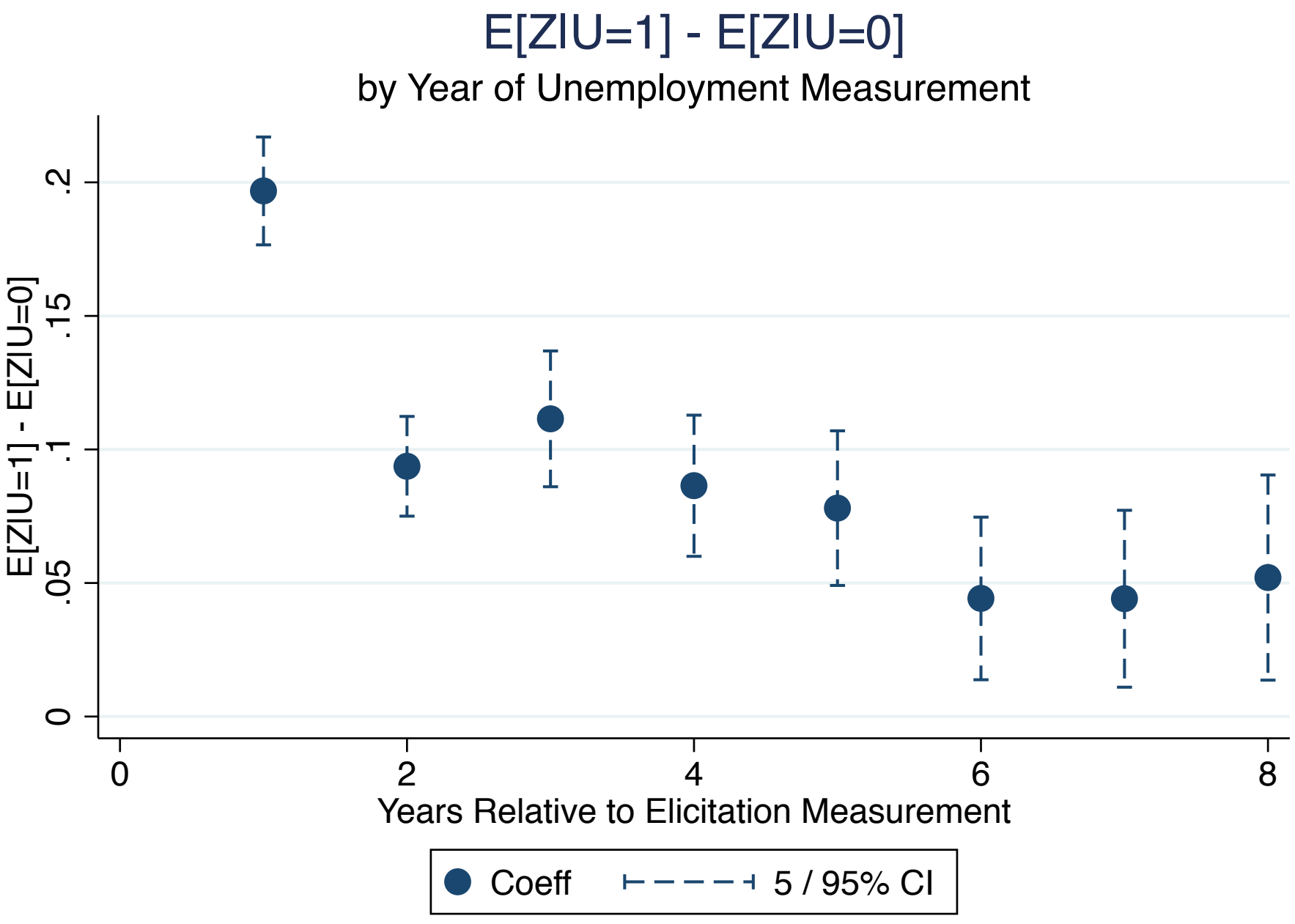
- Need "first stage"
  - First stage: How much do people learn in year $t-2$ vs $t-1$?

$$\begin{aligned}\Delta^{\text{First Stage}} &= \underbrace{E\left[P_{t-1,t}|U_t=1\right]-E\left[P_{t-1,t}|U_t=0\right]}_{\text{Knowledge in } t-1 \text{about } t} \\ &- \underbrace{E\left[P_{t-2,t}|U_t=1\right]-E\left[P_{t-2,t}|U_t=0\right]}_{\text{Knowledge in } t-2 \text{about } t}\end{aligned}$$

  - Assume measurement error in Z uncorrelated with U

$$E\left[Z|U\right] = E\left[P|U\right]$$

    - Natural for $E\left[Z_{t-1}|U_t\right]$
    - Likely attenuated for $E\left[Z_{t-2}|U_t\right]$ because Z_t elicits information about U_{t+1}, not U_{t+2}


E[ZIU=1] - E[ZIU=0]
by Year of Unemployment Measurement
E[ZIU=1] - E[ZIU=0]
0
.05
.1
.15
.2
0
2
4
6
8
Years Relative to Elicitation Measurement
Coeff
5 / 95% CI

"2-Sample IV" Welfare Calculation

Specification:	Full Sample	Employed t-2 and t-1	Controls for Needs	Fixed Effects	Over 40 Sample	(2) With Outliers
	(1)	(2)	(3)	(4)	(5)	(6)
Impact of Unemployment on $log(c_{t-2})$-$log(c_{t-1})$						
Unemp	-0.0336***	-0.0250***	-0.0264***	-0.0243*	-0.0262*	-0.0231*
s.e.	(0.00570)	(0.00942)	(0.0102)	(0.0133)	(0.0157)	(0.0121)
Specification Details						
Sample Employed in t-2 and t-1		X	X	X	X	X
Controls for change in log needs (t-2 vs t-1)			X	X	X	
Individual Fixed Effects				X		
Num of HHs	11055	10042	8869	8869	4772	10156
Split-Sample IV Welfare Calculation						
$\Delta^{\text{First Stage}}$	0.100	0.100	0.100	0.100	0.100	0.100
bootstrap s.e.	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
$d[\log(c_{pre}(p))]/dp$ (2-sample 2SLS)	0.35***	0.26***	0.28***	0.26**	0.27*	0.24**
s.e.	(0.06)	(0.09)	(0.10)	(0.13)	(0.16)	(0.12)
$W^{\text{ex-ante}}$ ($\sigma = 2$)	0.7***	0.52***	0.55***	0.53**	0.54*	0.48**
s.e.	(0.11)	(0.19)	(0.20)	(0.27)	(0.31)	(0.24)

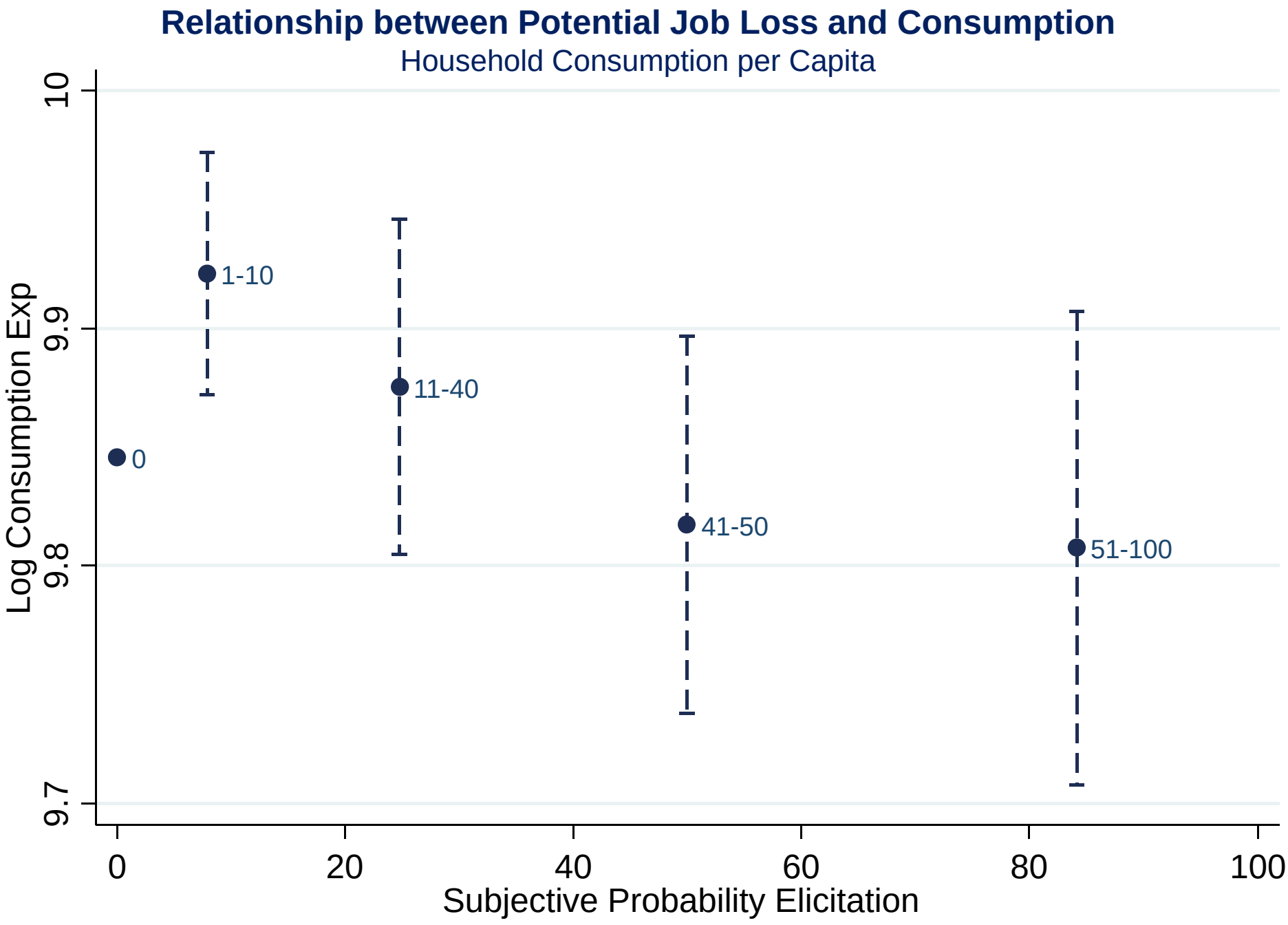
Conclusion

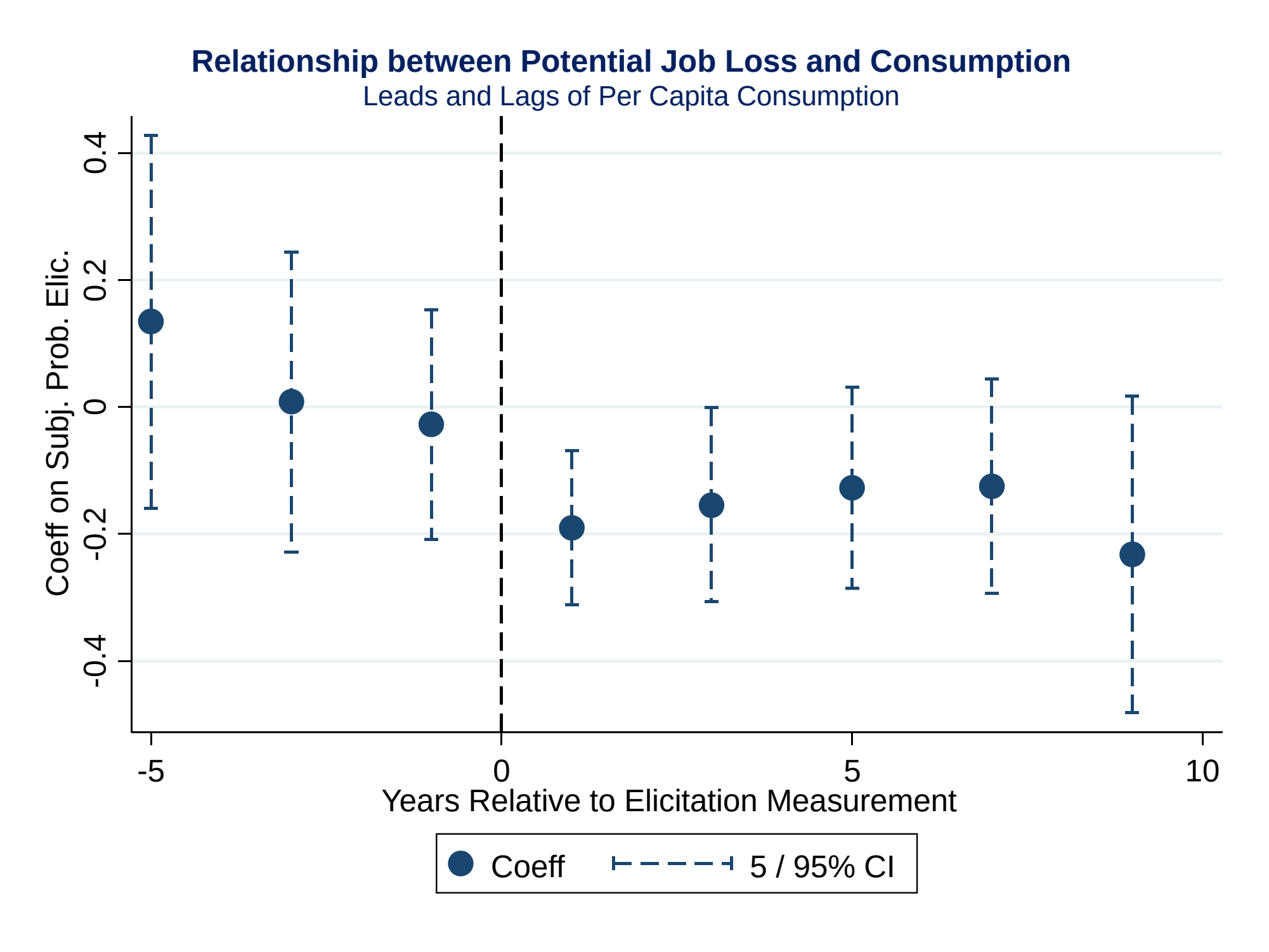
- Private information explains absence of private UI market
  - Lower bounds on markups in excess of 50% across subsamples
    - Point estimates around 300%
- People respond to knowledge about future unemployment
  - Individuals respond to potential job loss by decreasing consumption and increasing spousal labor supply
- Response to information provides method to estimate WTP for social insurance
  - WTP of 50-60% with $\sigma = 2$ and $\epsilon^{semi} = 0.5$
  - Suggests non-trivial value of social insurance for set who learned ex-ante

3 Appendix

Ex-Post Consumption Approach

- Test #1: Do c_u and c_e vary with p?
- Use consumption mail survey in HRS conducted in year after main survey
  - 10%(!) sub-sample
  - Regress ex-post consumption $log(c)$ on ex-ante Z
    - Recall: Z has large focal point bias at zero
  - Controls for wages, census division, year, age, gender, marital status, and unemployment status


Relationship between Potential Job Loss and Consumption
Household Consumption per Capita
Log Consumption Exp
10
9.9
9.8
9.7
0
1-10
11-40
41-50
51-100
0
20
40
60
80
100
Subjective Probability Elicitation


Relationship between Potential Job Loss and Consumption
Leads and Lags of Per Capita Consumption
Coeff on Subj. Prob. Elic.
0.4
0.2
0
-0.2
-0.4
-5
0
5
10
Years Relative to Elicitation Measurement
Coeff
5 / 95% CI

Consumption vs. Potential Job Loss (Z)

Specification:	Baseline	HH Cons	Sample Z > 0	Sample U = 0	Non-Durable Consumption	No Controls	No 1{Z=0} Control
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elicitation (Z)	-0.160**	-0.110*	-0.171**	-0.162**	-0.162**	-0.345***	-0.0401
s.e.	(0.0781)	(0.0596)	(0.0777)	(0.0783)	(0.0789)	(0.0798)	(0.0659)
Elicitation * Unemp (Z*U)	-0.137	-0.421**	-0.0771		-0.257	-0.0000475	-0.460**
s.e.	(0.268)	(0.207)	(0.268)		(0.303)	(0.296)	(0.218)
Eliciation of 0 (1{Z=0})	-0.0893***	-0.0587**		-0.0904***	-0.120***	-0.160***	
s.e.	(0.0334)	(0.0279)		(0.0334)	(0.0356)	(0.0365)	
Eliciation of 0 * Unemp (1{Z=0}*U	0.338	0.161			0.307	0.191	
s.e.	(0.222)	(0.180)			(0.220)	(0.239)	
Unemp (U)	-0.0845	0.0862	-0.120	0	-0.0936	-0.181	0.118
s.e.	(0.165)	(0.128)	(0.164)	(.)	(0.164)	(0.187)	(0.120)
Mean Dep Var	9.86	10.58	9.89		9.18	9.86	9.86
Num of Obs.	2,798	2,798	1,503		2,798	2,798	2,798
Num of HHs	862	862	579		862	862	862

#1 Ex-Post Consumption Approach: Translating to Welfare

- Two assumptions enable estimation of W:
  - Euler equation

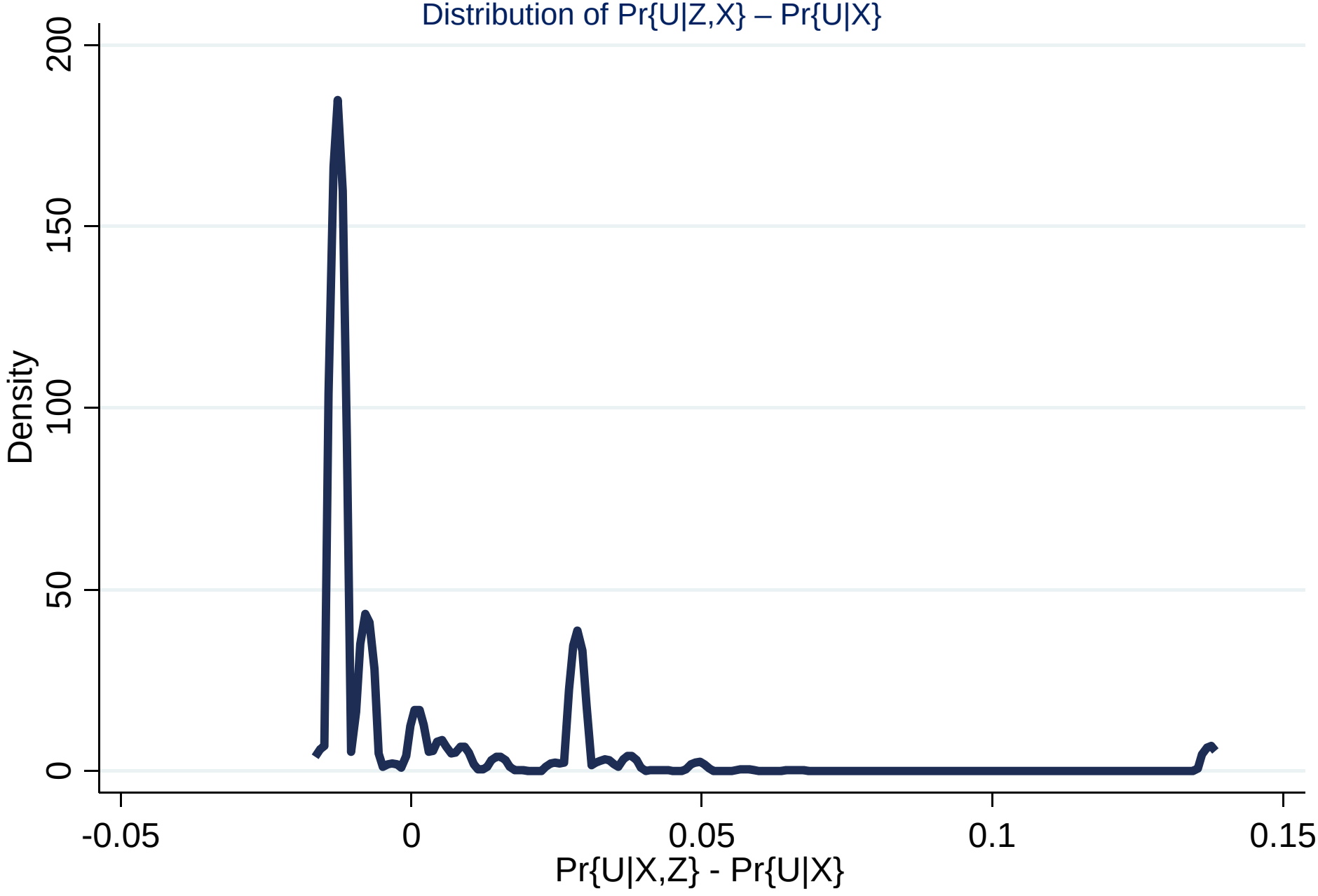
$$v'\left(c_{pre}\left(p\right)\right) = pu'\left(c_u\left(p\right)\right) + \left(1-p\right)v'\left(c_e\left(p\right)\right)$$

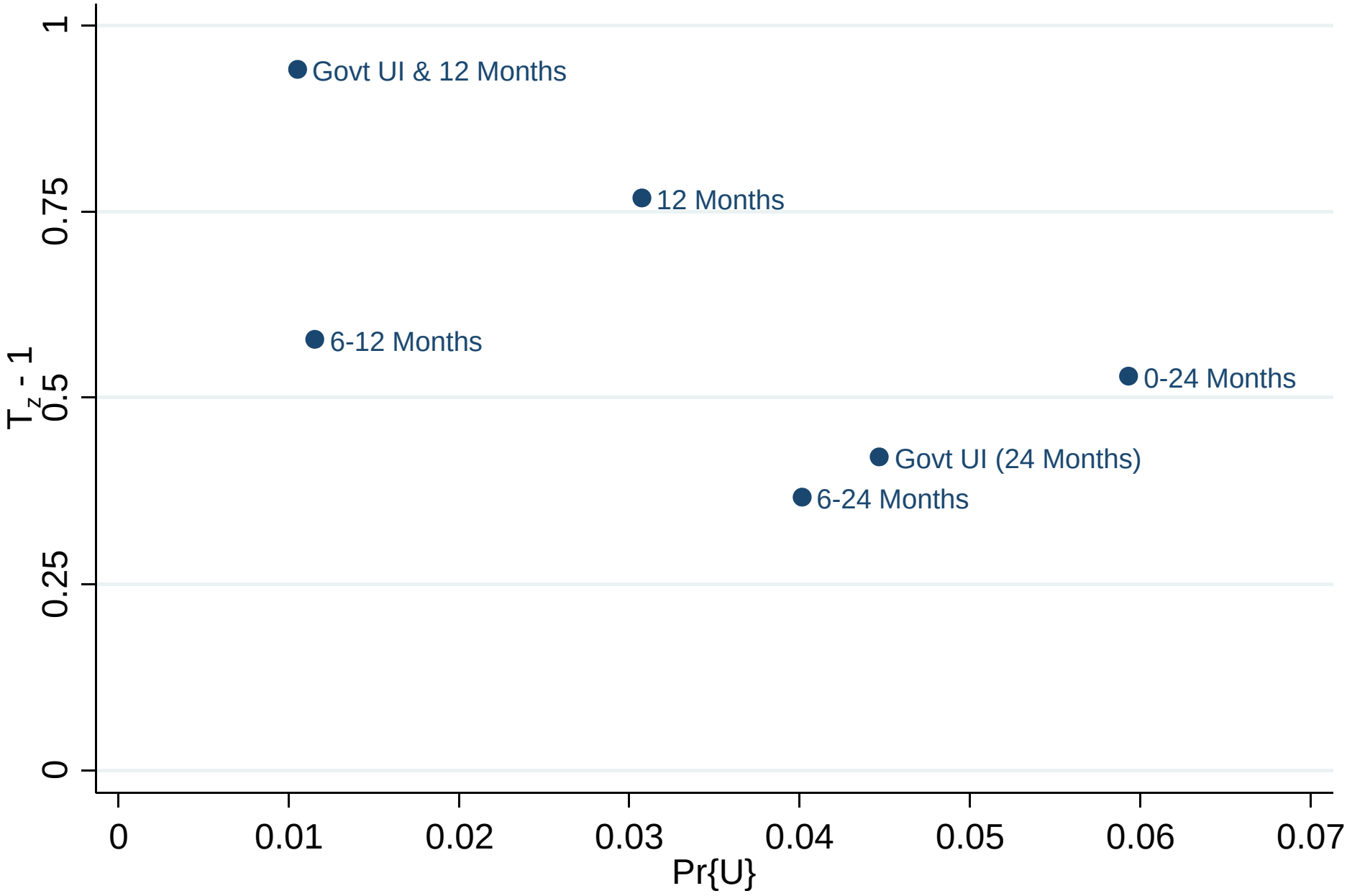
  - Minimal consumption impact of not losing your job: $E\left[c_e\right] \approx E\left[c_{pre}\right]$ (o.w. lower bound)
- Then:

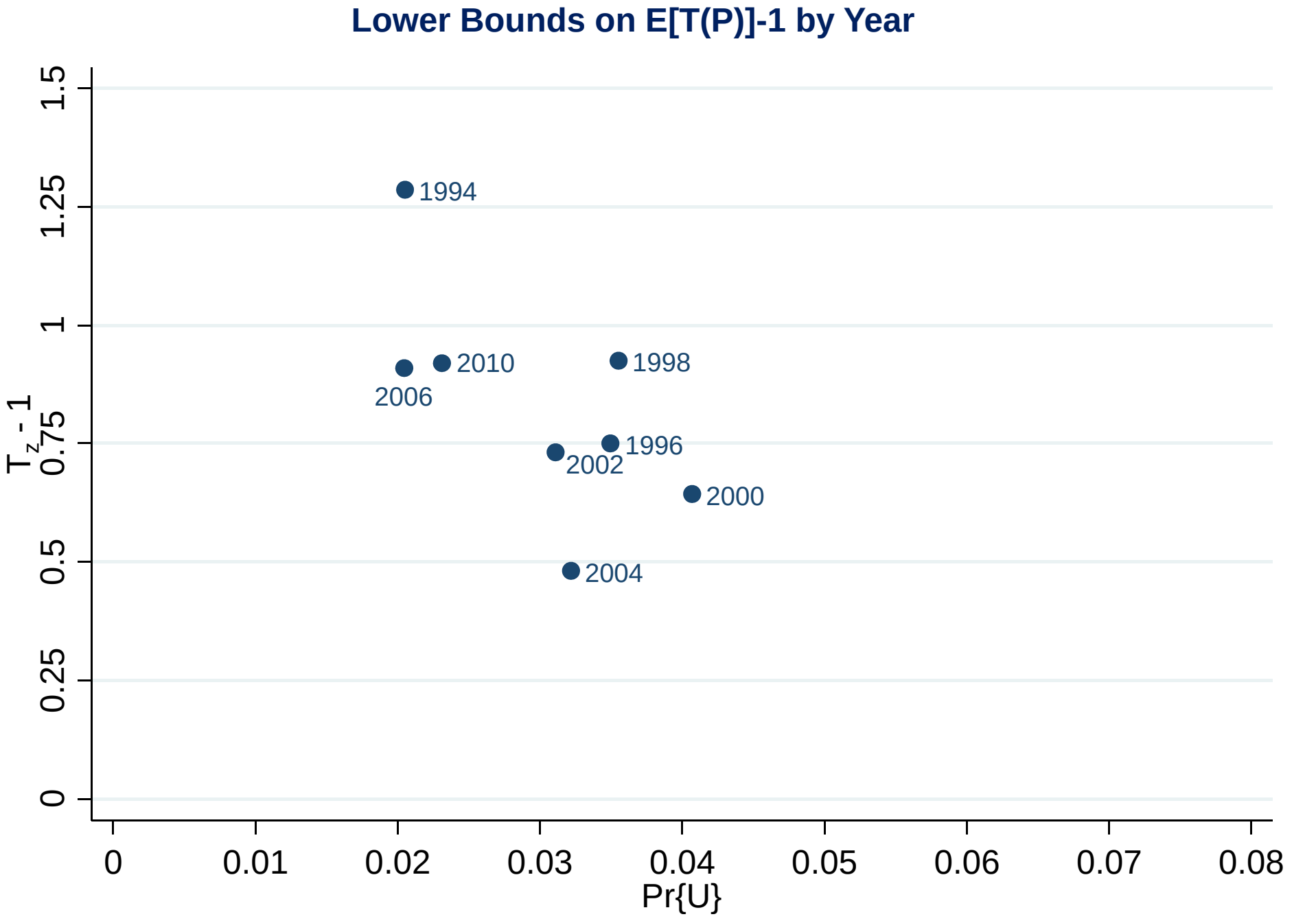
$$W = \sigma cov\left(\frac{-p}{\bar{p}}, \frac{c_e\left(p\right)}{\bar{c}_e}\right) \approx \sigma \frac{var\left(Z\right)}{\Pr\left\{L\right\}} \frac{cov\left(-Z, log\left(c_e\right)\right)}{var\left(Z\right)}$$

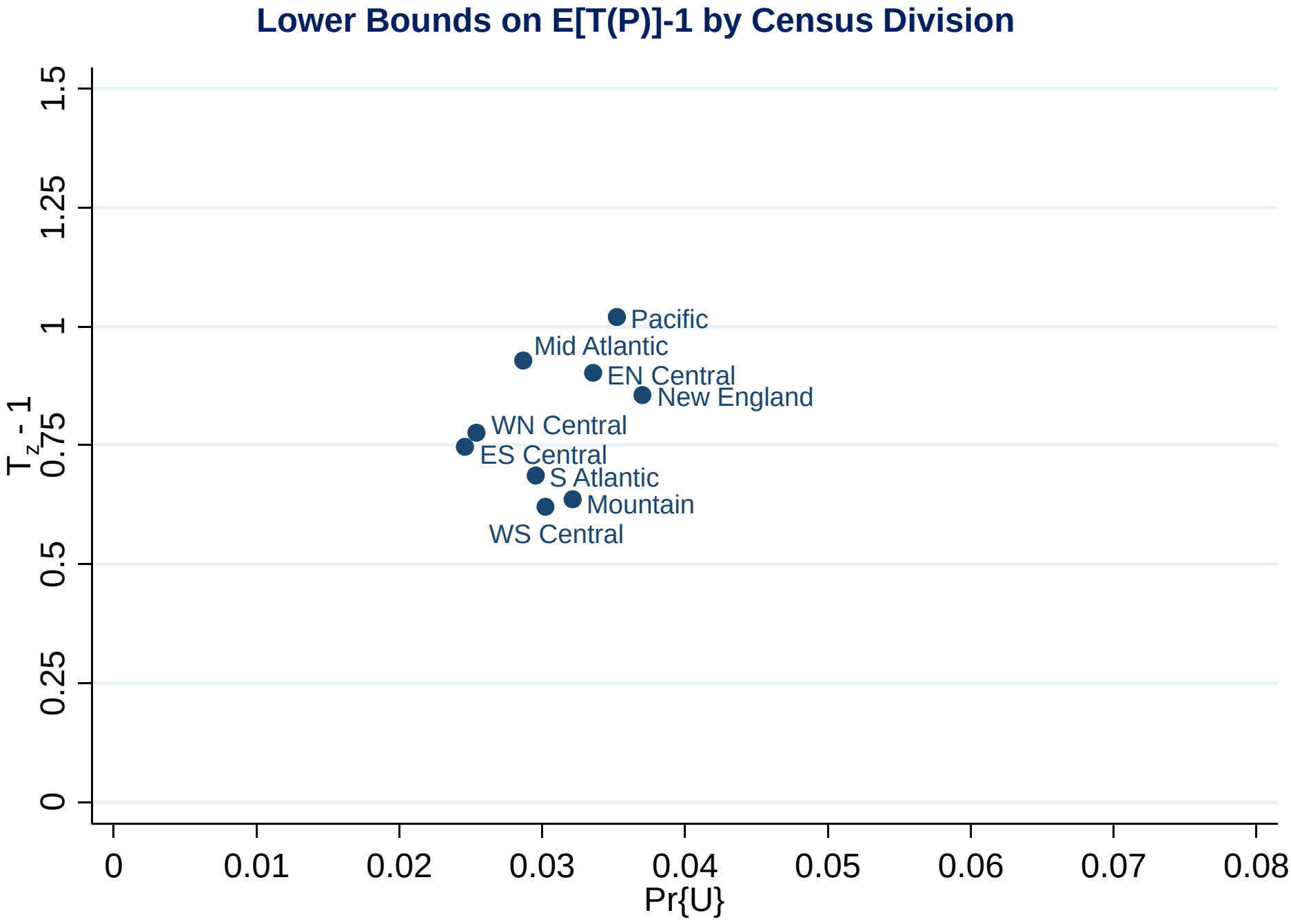
Welfare Calculation: Consumption vs. Potential Job Loss

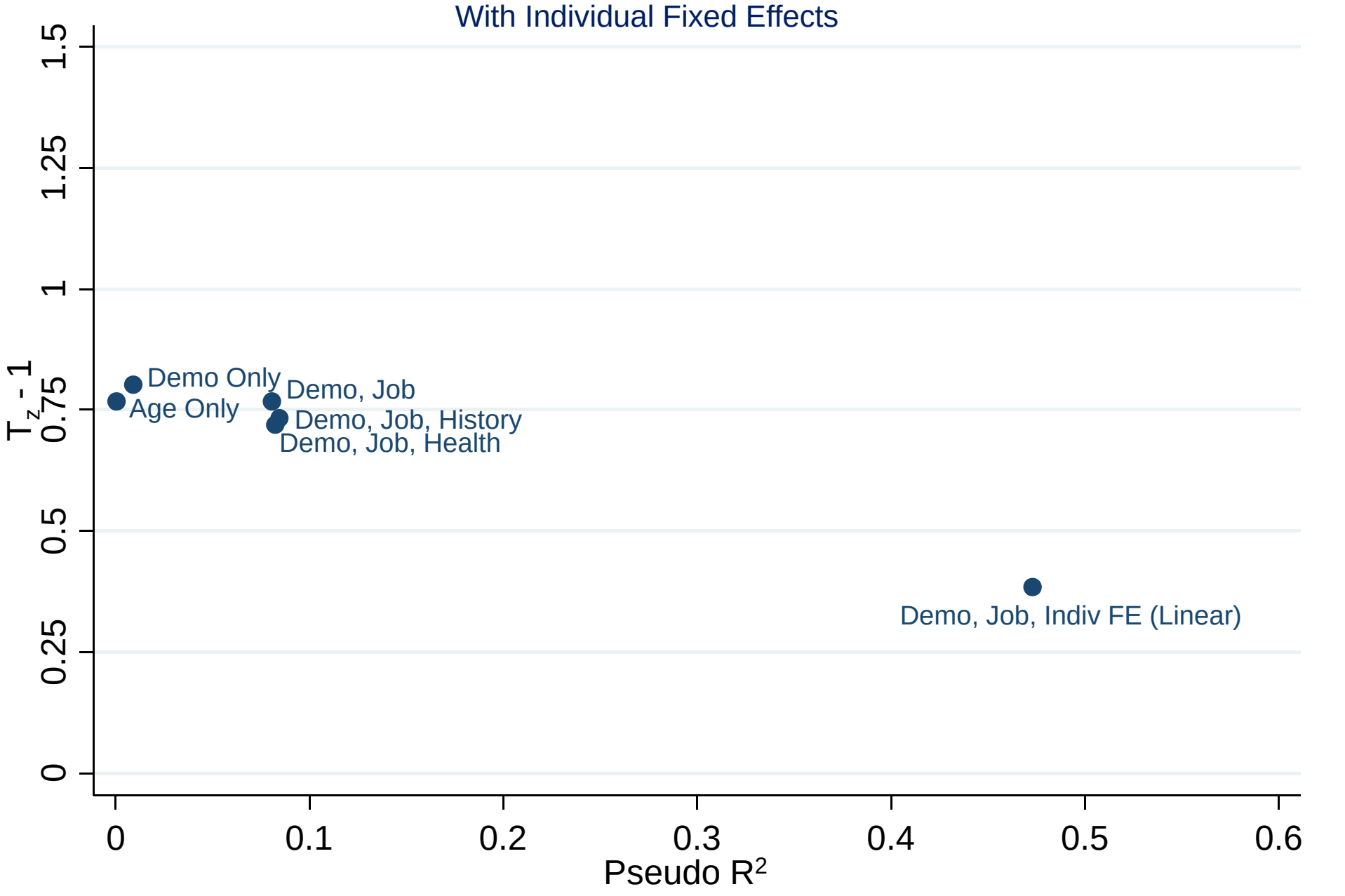
Specification:	Baseline	HH Cons	Sample U = 0	Non-Dur Cons	No 1{Z=0} Control
Elicitation (Z)	-0.160**	-0.110*	-0.162**	-0.162**	-0.0401
s.e.	(0.0781)	(0.0596)	(0.0783)	(0.0789)	(0.0659)
Welfare Calculation					
Scaling Factor (Var(Z|X) / Pr{L})	1.53	1.53	1.40	1.53	1.53
bootstrap s.e.	(0.15)	(0.15)	(0.15)	(0.14)	(0.15)
Cov(p/E[p],log(c_e))	0.25**	0.17*	0.23**	0.25**	0.06
bootstrap s.e.	(0.12)	(0.09)	(0.11)	(0.12)	(0.10)
Implied WTP (CRRA = 2)	**0.49****	**0.34***	**0.45****	**0.5****	**0.12**
bootstrap s.e.	(0.23)	(0.19)	(0.23)	(0.23)	(0.20)
Mean Dep Var	9.86	10.58	9.87	9.18	9.86
Num of Obs.	2,798	2,798	2,696	2,798	2,798
Num of HHs	862	862	843	862	862


Predictive Content of Elicitations about Future Unemployment
Distribution of Pr{U|Z,X} – Pr{U|X}
Density
0
50
100
150
200
-0.05
0
0.05
0.1
0.15
Pr{U|X,Z} - Pr{U|X}


Lower Bounds on E[T(P)]-1 using Alternative U Definitions
Govt UI & 12 Months
12 Months
6-12 Months
0-24 Months
Govt UI (24 Months)
6-24 Months
T_z - 1
0
0.25
0.5
0.75
1
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Pr{U}


Lower Bounds on E[T(P)]-1 by Year
1994
2010
1998
2006
1996
2002
2000
2004
T_z - 1
0
0.25
0.5
0.75
1
1.25
1.5
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}


Lower Bounds on E[T(P)]-1 by Census Division
T_z - 1
0
0.25
0.5
0.75
1
1.25
1.5
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Pr{U}
Pacific
Mid Atlantic
EN Central
New England
WN Central
ES Central
S Atlantic
Mountain
WS Central


Lower Bounds for E[T(P)]-1 using Alternative Controls
With Individual Fixed Effects
T_z - 1
1.5
1.25
1
0.75
0.5
0.25
0
Demo Only
Age Only
Demo, Job
Demo, Job, History
Demo, Job, Health
Demo, Job, Indiv FE (Linear)
0
0.1
0.2
0.3
0.4
0.5
0.6
Pseudo R^2