An Evaluation of Optimal Unemployment Insurance Using Two Natural Experiments

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Motivation

- Unemployment insurance (UI) benefit protects individuals against the risk of earnings loss during unemployment
- But UI benefit also distorts incentives to search for jobs
- UI benefit increases unemployment duration through two distinct channels (Chetty, 2008):
  1. Moral hazard effect (welfare cost)
     - More generous UI incentivizes people to keep unemployed to get UI benefits
  2. Liquidity effect (welfare gain)
     - More generous UI assist people with little saving to smooth their consumption during unemployment
- Distinguishing liquidity effect from moral hazard effects has important welfare implications
- However, the variation in UI benefits usually confounds these two effects
- Empirically, only a few papers (Chetty, 2008; Card et. al, 2007; Landais, 2015) can distinguish the liquidity effect from the moral hazard effect of UI benefits

This Paper

Overview

- We disentangle the liquidity effect from the moral hazard effect using UI administrative data and two natural experiments in Taiwan

1. Use discontinuity in eligibility for extended UI benefits to identify the **(total) effects of UI extension**:
   - Since 2009, UI recipients aged 45 or older at job loss are eligible for 9 months (270 days) benefits, rather 6 months (180 days) for those under 45
2. Use the effect of reemployment bonus to identify the **moral hazard effect**
   - Since 2003, UI recipients who find a job before exhausting benefits can receive 50% of remaining benefits
     - Reemployment bonus does not change the income stream during unemployment so it does not have liquidity effect
     - But it affects people's incentive to keep unemployed
   - Use variation in bonus offer around the time when bonus was introduced to estimate the effects of reemployment bonus

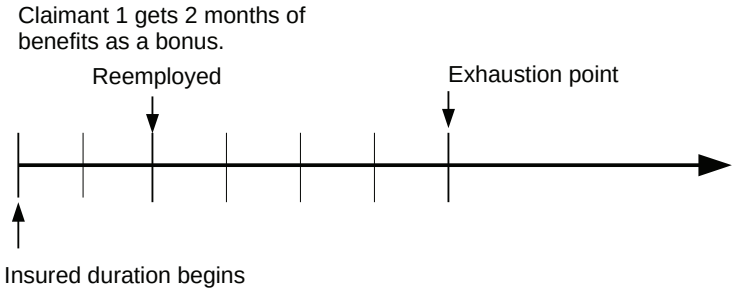
Institutional Background

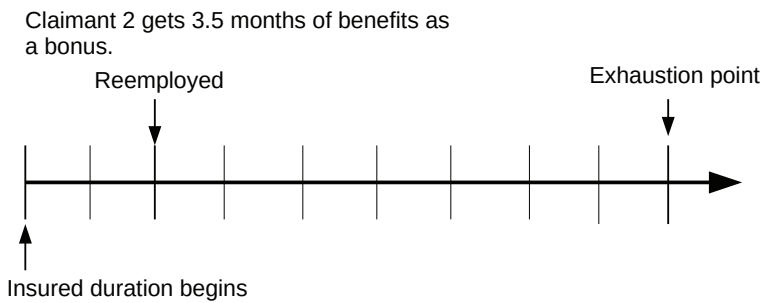
- In Taiwan, job losers aged 15-65 with at least one year of work history in the three years prior to layoff are eligible for UI benefits

1. **Replacement rate**
   - 60% of recipients' average monthly earnings during the 6 months prior to layoff
2. **Potential benefit duration**
   - Since 2009, the potential benefit duration has been 9 months (270 days) for workers aged 45 or older at job loss, rather than 6 months (180 days) for those under 45
3. **Reemployment bonus**
   - UI recipients can receive bonuses equal to 50% of remaining benefits, if they find jobs before benefit exhaustion and keep the job for at least three months

Examples

- Claimant 1 is age 44 at job loss and Claimant 2 is age 45 at job loss





Job Search: Static Version

- Consider a static search model in Chetty (2008).

$$J(s) = \max_{s} (1-s)u(A+b) + su(A+w+r-\tau) - g(s), \text{ where } r = \theta b$$

- Optimal search satisfies:

$$u(c^e) - u(c^u) = g'(s)$$

- The effect of an increase in b is a combination of a liquidity effect ($\frac{\partial s}{\partial A}$) and a moral hazard effect ($-\frac{\partial s}{\partial w}$).

$$\begin{aligned} \frac{\partial s}{\partial b} &= \frac{\partial s}{\partial A} - (1-\theta)\frac{\partial s}{\partial w} \\ &= \frac{\partial s}{\partial A} - (1-\theta)\frac{\partial s}{\partial r} \end{aligned}$$

Welfare: Static Version

- Social planner maximizes welfare by choosing b

$$W(b,\theta) = \max_{b} su(A+w+r-\tau) + (1-s)u(A+b) - g(s)$$

$$s.t.(1-s)b + sr = s\tau;$$

- The welfare effect of increasing b depends on the relative size of consumption smoothing benefits and increased unemployment.

$$\frac{dW}{db}/u'(c^e) = \frac{1-s}{s}[\frac{u'(c^u)-u'(c^e)}{u'(c^e)} - \frac{\epsilon_{1-s,b}}{s}]$$

- The ratio of the liquidity to moral hazard effect equals consumption smoothing benefits.

$$\frac{u'(c^u)-u'(c^e)}{u'(c^e)} = \frac{\partial s/\partial A}{\partial s/\partial w} = \frac{\partial s/\partial A}{\partial s/\partial r}$$

Data

- UI claims and earnings records for the population of UI recipients in Taiwan from 1999 to 2012
- Each observation contains
  - date of job loss and date of birth
  - insured duration of unemployment and nonemployment duration
  - monthly earnings and some demographic information
- Sample for extended benefits: 20,906 UI recipients age 43 to 46 at job loss between May 2009 and December 2012. (about 10% of all recipients)
- Sample for bonuses: 91,889 UI recipients between January 2002 and July 2003.

The Effect of UI Extension on Benefit Duration

Figure: Benefit Duration: 2009-2013

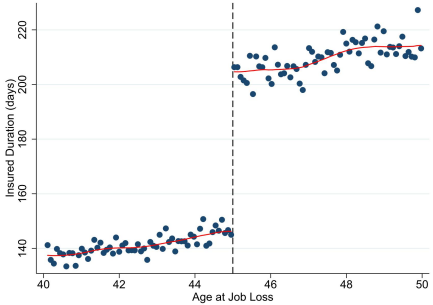
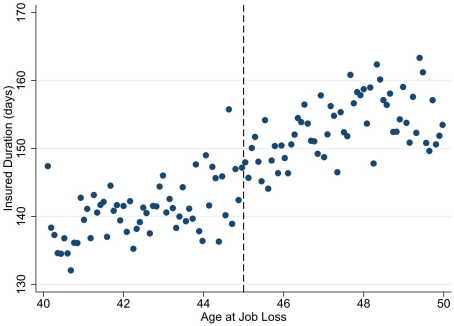
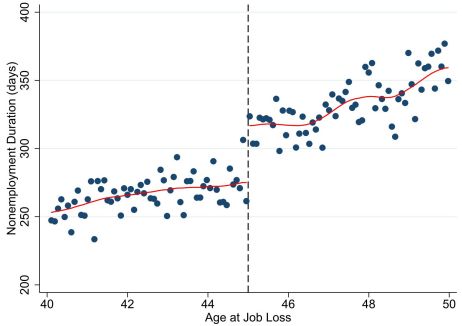


Figure: Benefit Duration: 2005-2008



The Effect of UI Extension on Nonemployment Duration

Figure: Nonemployment Duration: 2009-2013



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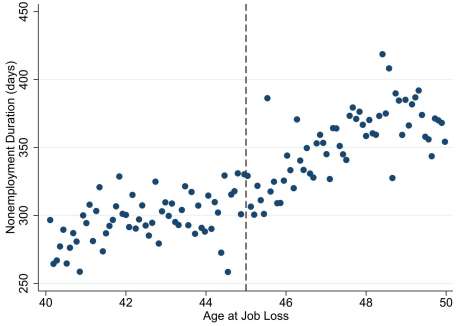


The Effect of UI Extension on Monthly Reemployment Hazard

1st-6th month

Figure: Monthly Reemployment Hazard (1st-6th month): 2009-2013

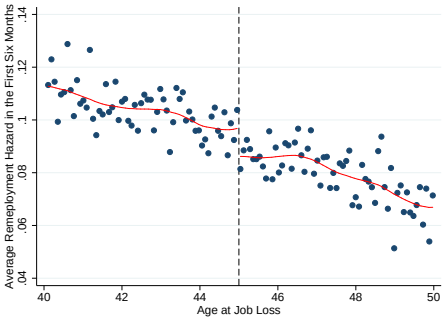
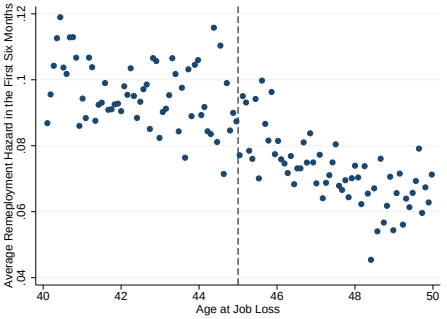


Figure: Nonemployment Duration: 2005-2008



Estimate the Effect of UI Extension

Research Design: Regression Discontinuity Design

- To estimate the effect of UI extension, we conduct the following RD design:

$$y_i = \alpha + \beta_{EB} Age45_i + f(a_i) + v_i$$

  - y_i: duration outcomes, reemployment hazard
  - a_i: "age at job loss"
  - $Age45_i = 1[a_i \geq 45]$
  - $f(a_i)$: a polynomial function of a_i interacted with $Age45_i$

- We estimate this regression within specific age range $45 - b < a_i < 45 + b$
- Bandwidth (b): optimal bandwidth proposed by Calonico, Cattaneo, and Titiunik (2014)

Estimation Results

The Effect of UI Extension

- The Effect of 90-day increase in UI benefits on benefit duration, nonemployment duration and monthly reemployment hazard

Table 4: The Effect of Extended Benefits on Unemployment Duration and Monthly Reemployment Hazard

	(1)	(2)	(3)	(4)	(5)
Insured Duration					
β_{EB}	57.96***	58.29***	56.55***	56.12***	57.09***
	(1.97)	(1.95)	(1.50)	(1.74)	(2.25)
Baseline mean			147.32		
Sample size	20,906	20,893	40,507	40,507	37,785
Nonemployment Duration					
β_{EB}	41.14***	43.02***	36.23***	37.76***	40.41***
	(6.90)	(6.90)	(5.18)	(6.01)	(7.96)
Baseline mean			276.39		
Sample size	20,906	20,893	40,987	40,987	36,589
Monthly Reemployment Hazard					
β_{EB}	-0.017***	-0.018***	-0.016***	-0.017***	-0.017***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Baseline mean			0.084		
Sample size	119,802	119,753	213,478	213,478	278,748
Bias-corrected	–	–	–	Yes	Yes
Covariates	–	Yes	–	–	–
Poly. model	linear	linear	linear	linear	quadratic
Bandwidth (days)	730	730	CCT	CCT	CCT

Estimate the Effect of Reemployment Bonus

Description of Bonus Treatment

- The reemployment bonus program reached back to UI recipients who were receiving benefits when the program took effect in January 1, 2003
  - Example: a worker starting UI spell on Nov. 1, 2002 found a job on Jan. 1, 2003 would receive two months of benefits a a bonus.

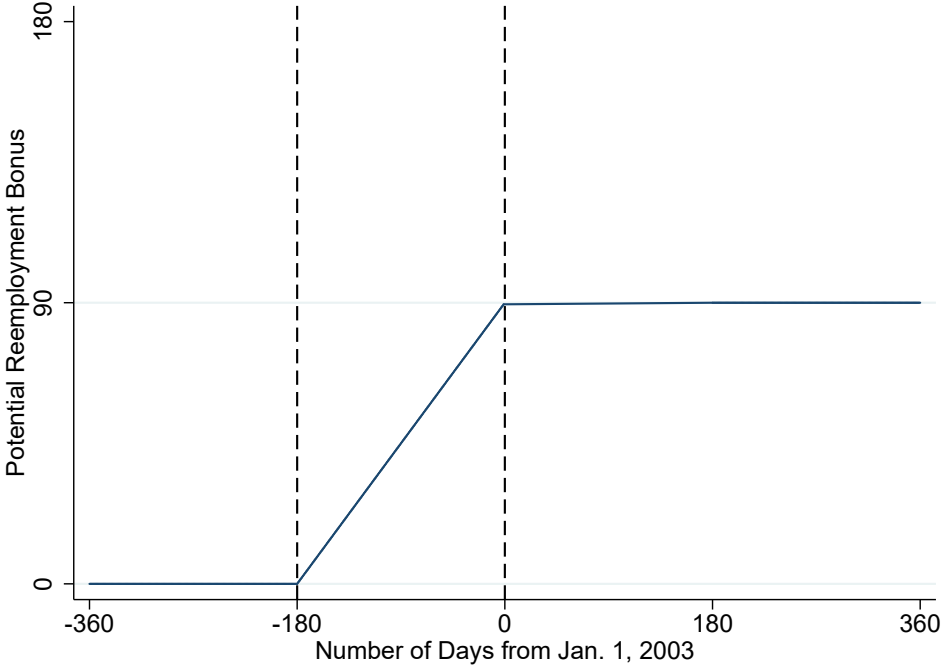
1 Cohorts starting UI spell before July 5th, 2002
  - They were not eligible for reemployment bonus

2 Cohorts starting UI spells between July 5th, 2002 and December 31st, 2002
  - They were partially exposed to the bonus program due to the reach back provision

3 Cohorts starting UI spells after January 2003
  - They were fully exposed to the bonus program

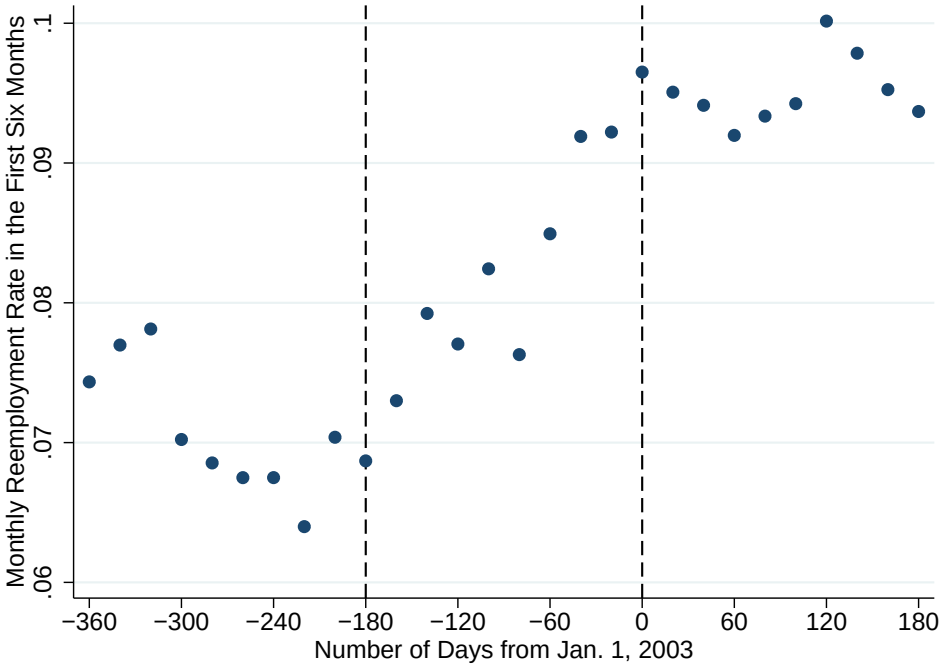
Estimate the Effect of Reemployment Bonus

Description of Bonus Treatment



Average Reemployment Hazard and UI Starting Date

Figure: Monthly Reemployment Hazard from Jan. 2002 to July 2003



Average Reemployment Hazard and UI Starting Date (Age 35-50)

Figure: Monthly Reemployment Hazard from Jan. 2002 to July 2003

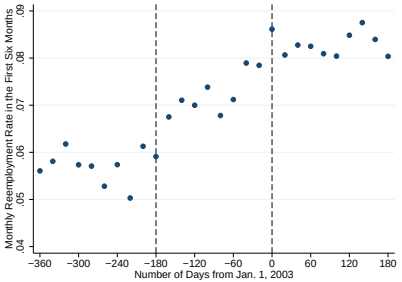
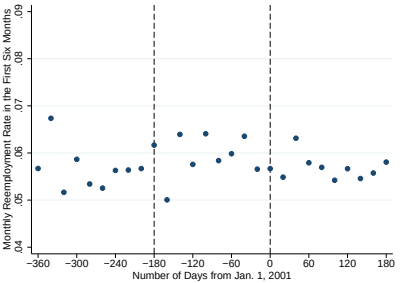


Figure: Monthly Reemployment Hazard from Jan. 2000 to July 2001



▸ Density ▸ Covariates

Estimate the Effect of Reemployment Bonus

Research Design: Regression Kink Design

- We estimate the following hazard model:

$$h_{im} = \alpha + \gamma(t_i - c) + \beta(t_i - c) \cdot D$$

- h_{im}: the reemployment probability in month $m+1$ given worker i was not employed in month m
- t: the first date of benefits receipt
- c: the cutoff date
- $D = 1[t_i - c \geq 0]$
- Using kink 1, $180 \cdot \beta$ identifies the effect of a 90-day increase in benefits as a bonus.
- Using kink 2, $-180 \cdot \beta$ identifies the effect of a 90-day increase in benefits as a bonus.

Estimation Results

The Effect of Reemployment Bonus

- The effect of a reemployment bonus equivalent to 90 days of UI benefits on monthly reemployment hazard (1st-6th month) for workers aged **35-50** at job loss

Table 5: The Effect of Reemployment Bonus on Monthly Reemployment Hazard

	(1)	(2)	(3)	(4)	(5)
Kink 1: Monthly Reemployment Hazard					
$180 \times \beta_{RB}$	0.021***	0.024***	0.019***	0.016***	0.020***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Baseline mean			0.053		
Sample size	120,045	120,045	120,045	159,191	159,191
Kink 2: Monthly Reemployment Hazard					
$-180 \times \beta_{RB}$	0.014**	0.015**	0.014**	0.016**	0.018**
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Baseline mean			0.064		
Sample size	100,557	100,557	100,557	108,009	108,009
Bias-corrected	–	–	–	–	Yes
Covariates	–	Yes	–	–	–
Discontinuity	–	–	Yes	–	–
Poly. model	linear	linear	linear	linear	linear
Bandwidth (days)	150	150	150	CCT	CCT

Note: This table shows the estimates of the effect of eligible for reemployment bonus on the reemployment hazard between the 1st and 6th month of nonemployment. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Liquidity Effect and Moral Hazard Effect

- To incorporate dynamics, we need to discount the moral hazard by multiplying $S(P)$

$$\underbrace{\frac{\partial s_t}{\partial P}}_{\text{Total Effect}} = \underbrace{b\frac{\partial s_t}{\partial A_t}}_{\text{Liquidity Effect}} - (1-\theta)S_{t+1}(P) \underbrace{b\frac{\partial s_t}{\partial r_t}}_{\text{Moral Hazard Effect}}$$

- Plug in the estimated effects of extended benefits and reemployment bonuses

$$-0.017 = b\frac{\partial s_0}{\partial A_0} - 0.5 \cdot 0.6 \cdot 0.020$$

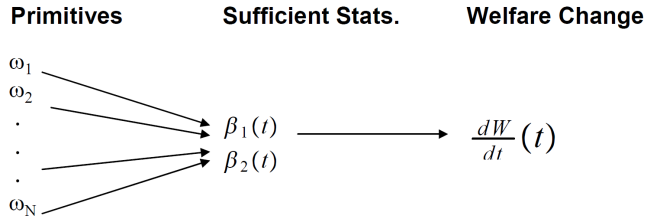
- The liquidity effect explains 65% of the total effect of UI extension
  - $\frac{b\frac{\partial s_0}{\partial A_P}}{b\frac{\partial s_0}{\partial P}} = 0.011/0.017 = 0.65$
- We find $\frac{dW_0}{dP} > 0$, suggesting a marginal increase in potential benefit duration is welfare enhancing.

Conclusion

- We disentangle the liquidity effect from the moral hazard effect and estimate the welfare effect of a UI extension
  - Use UI administrative data and two natural experiments in Taiwan
- A 90-day increase in potential benefit duration
  - increases benefit duration and nonemployment duration by 57 days (40%) and 41 days (15%)
  - reduces reemployment hazard by 1.7 percentage points in the first six months.
- Eligibility for the reemployment bonus (90-day of benefits)
  - increases reemployment hazard by about 2 percentage points for middle-aged workers.
- We estimate that the liquidity effect accounts for 65% of the effect of extended UI benefits.
- Our results suggest a marginal increase in potential benefit duration improves welfare.

- Back-up slides

Sufficient Statistic Approach - Chetty (2009)



ω=preferences, constraints	$\beta = f(\omega,t)$ $y = \beta_1 X_1 + \beta_2 X_2 + \varepsilon$	dW/dt used for policy analysis
ω not uniquely identified	β identified using program evaluation	

Table 1: Descriptive Statistics for Extended Benfits Sample

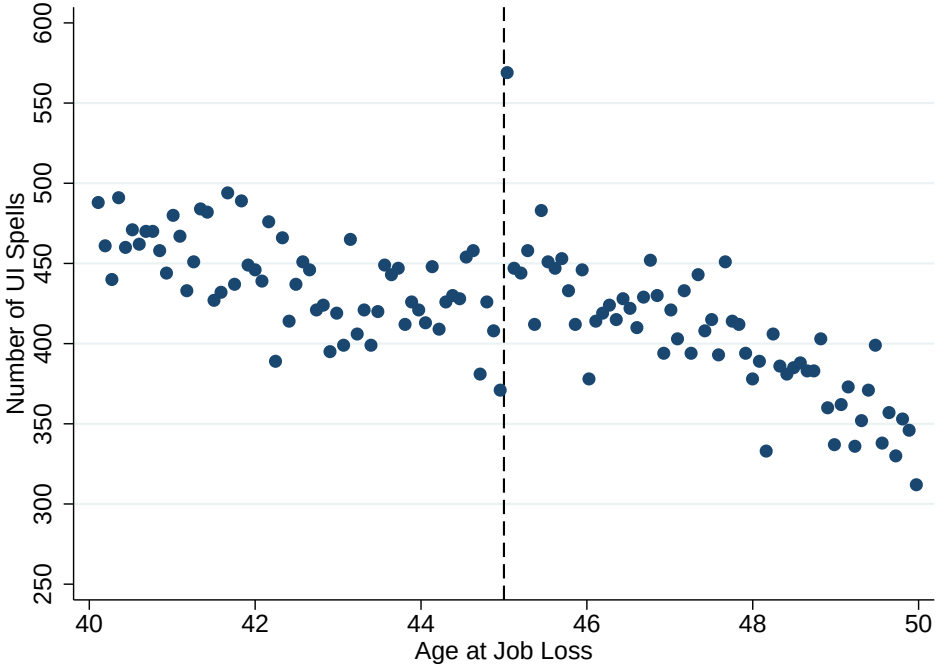
	All	43-46	15-30	30-45	45-65
	(1)	(2)	(3)	(4)	(5)
age (years)	36.90	44.99	26.67	36.65	50.24
female	0.52	0.49	0.59	0.52	0.46
number of dependants	.63	1.13	0.16	0.82	0.80
previous wage (NTD)	29,316	30,853	25,675	30,516	31,134
insured duration (days)	143.68	175.04	113.09	129.83	213.30
nonemployment duration (days)	252.84	294.97	198.44	236.04	358.83
right censored at 730 days	0.11	0.14	0.05	0.09	0.21
exhaustion rate	0.51	0.65	0.37	0.50	0.73
recall rate	0.13	0.12	0.11	0.12	0.18
reemployment wage (NTD)	25,231	25,907	23,102	25,902	26,367
observations	199,500	20,893	55,092	100,242	44,166

Table 2: Descriptive Statistics for Reemployment Bonus Sample

	01/2002-06/2002 (1)	07/2002-12/2002 (2)	01/2003-12/2003 (3)
age (years)	36.06	36.27	36.88
female	0.53	0.56	0.56
previous wage (NTD)	26,994	26,773	27,177
insured duration	151.68	144.87	134.44
nonemployment duration	368.08	334.77	306.48
right censored	0.11	0.09	0.08
exhaustion rate	0.69	0.62	0.55
recall rate	0.11	0.10	0.11
reemployment wage	23,402	23,113	22,983
observations	38,429	29,044	24,426

RD—Density Test

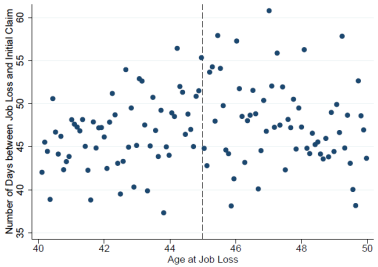
back



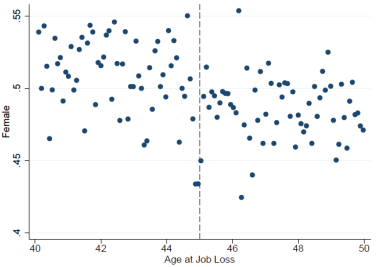
RD—Smoothness of Observables

back

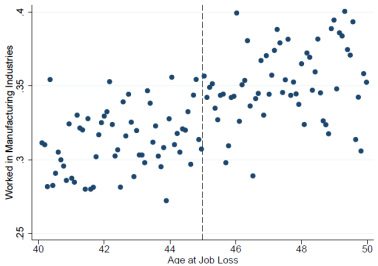
(a) Number of Days Between Job Loss and Initial Claim



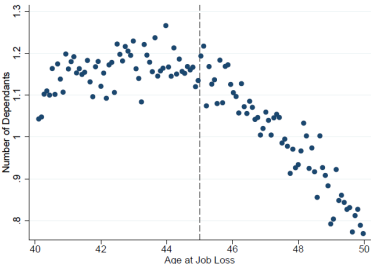
(b) Female



(c) Worked in Manufacturing Sector (Last Job)



(d) Number of Dependents



RD—Predicted Nonemployment Duration

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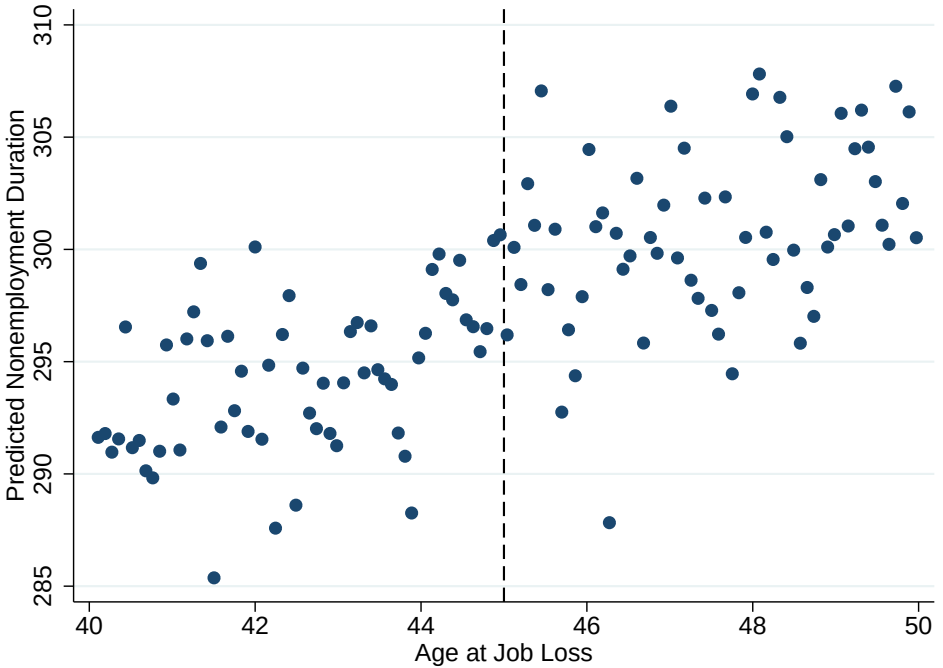


RD—Smoothness of Observables

back

	(1) Delay Days	(2) Female	(3) Manu. Sector	(4) # of Dependents	(5) Log Previous Earnings	(6) Predicted Nonemp. Dur.
β_{EB}	-0.70	-0.00	0.018*	0.01	0.013*	1.34
	(2.06)	(0.10)	(0.010)	(0.01)	(0.007)	(1.31)
Sample size	46,916	43,035	42,036	37,961	50,903	50,706
Poly. model	linear	linear	linear	linear	linear	linear
Bandwidth (days)	CCT	CCT	CCT	CCT	CCT	CCT

Average Reemployment Hazard and UI Starting Date

After UI Benefits Exhaustion

Figure: Monthly Reemployment Hazard After Reform: 2002-2003

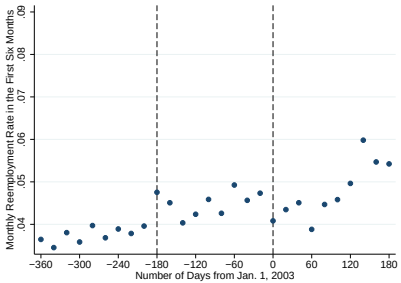
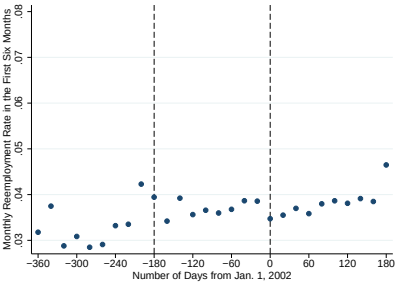
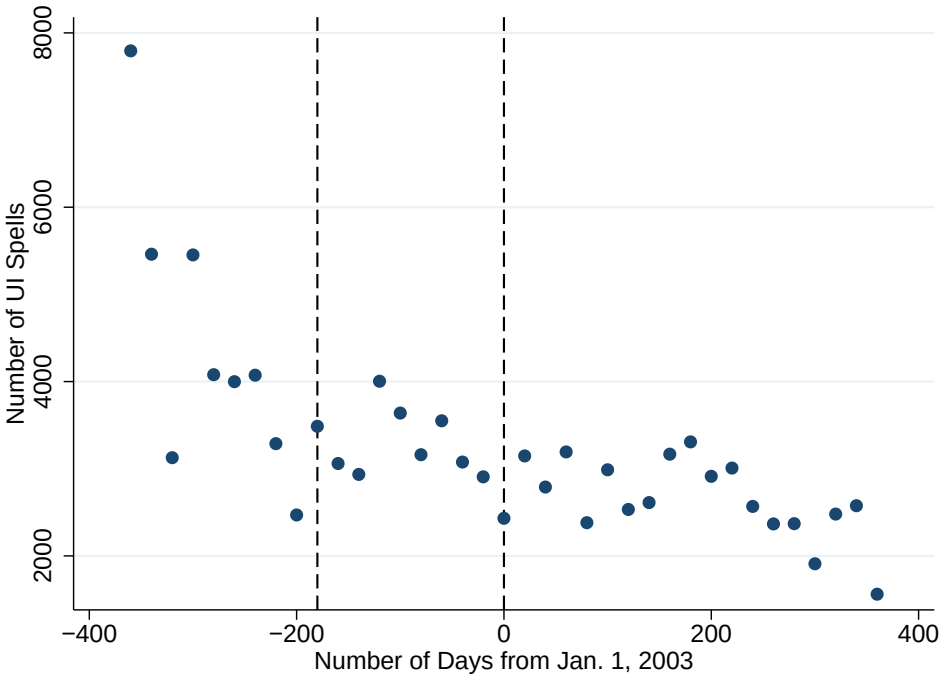


Figure: Monthly Reemployment Hazard Before Reform: 2001-2002



RK—Density Test

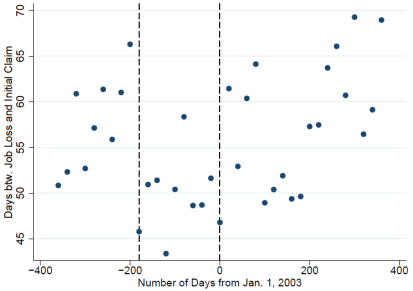
back



RK—Smoothness of Observables

back

(a) Number of Days Between Job Loss and Initial Claim



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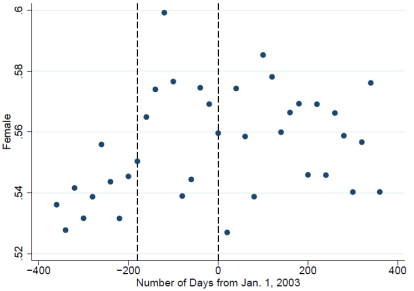

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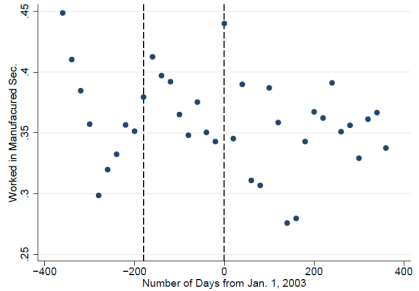

(d) Age at Job Loss