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.

Claimant 1 gets 2 months of benefits as a bonus.

- Reemployed
- Exhaustion point

Insured duration begins

Claimant 2 gets 3.5 months of benefits as a bonus.

- Reemployed
- Exhaustion point

Insured duration begins
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 (\( -\frac{\partial s}{\partial w} \)).

\[
\frac{\partial s}{\partial b} = \frac{\partial s}{\partial A} - (1 - \theta) \frac{\partial s}{\partial w} \\
= \frac{\partial s}{\partial A} - (1 - \theta) \frac{\partial s}{\partial r}
\]
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.

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

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)

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

Figure: Nonemployment Duration: 2005-2008
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
To estimate the effect of UI extension, we conduct the following RD design:

\[ y_i = \alpha + \beta_{EB} Age_{45i} + f(a_i) + \nu_i \]

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

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

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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 as 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

![Graph showing the effect of reemployment bonus over time from January 1, 2003.](image)
Average Reemployment Hazard and UI Starting Date

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

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

<table>
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<td>180 × β_{RB}</td>
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<td>Kink 2: Monthly Reemployment Hazard</td>
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<td>−180 × β_{RB}</td>
<td>0.014**</td>
<td>0.015**</td>
<td>0.014**</td>
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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 $S(P)$

\[
\frac{\partial s_t}{\partial P} = b \frac{\partial s_t}{\partial A_t} - (1 - \theta) S_{t+1}(P) \frac{\partial s_t}{\partial r_t}
\]

Total Effect  
Liquidity Effect  
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

\[
\frac{b \frac{\partial s_0}{\partial A_P}}{b \frac{\partial s_0}{\partial P}} = \frac{0.011}{0.017} = 0.65
\]

- 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)

Primitives: $\omega_1$, $\omega_2$, ..., $\omega_N$

Sufficient Stats: $\beta_1(t)$, $\beta_2(t)$

Welfare Change: $\frac{dW}{dt}(t)$

$\omega =$ preferences, constraints

$\beta = f(\omega, t)$

$y = \beta_1X_1 + \beta_2X_2 + \epsilon$

$\frac{dW}{dt}$ used for policy analysis

$\omega$ not uniquely identified

$\beta$ identified using program evaluation
Sample 1
Estimate the Effect of UI extension

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<th></th>
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<th>30-45</th>
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<td>0.49</td>
<td>0.59</td>
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Sample 2

Estimate the Effect of Reemployment Bonus

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RD—Density Test

Age at Job Loss vs. Number of UI Spells

- Age at Job Loss: 40, 42, 44, 46, 48, 50
- Number of UI Spells: 250, 300, 350, 400, 450, 500, 550, 600
RD—Smoothness of Observables

(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

Age at Job Loss

Predicted Nonemployment Duration

285 290 295 300 305 310

40 42 44 46 48 50

285 290 295 300 305 310

40 42 44 46 48 50

28 / 32
### RD—Smoothness of Observables

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

(b) Female

(c) Worked in Manufacturing Sector (Last Job)

(d) Age at Job Loss