The Value of Unemployment Insurance

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OECD

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Motivation: Value of Insurance

- Key for social insurance design:
  - Large literature on labour supply responses = cost of social insurance
  - Much less work on corresponding value of social insurance

- Conceptually easy; value of transferring dollar from good to bad state

- Challenge: how to evaluate in practice - especially when social insurance is mandated?
Unemployment and Consumption Drops

- Large literature studies consumption response to income shock and tests for presence of (partial) insurance.
- “Consumption-Based Implementation” (Baily-Chetty, Gruber ’97)
  - Consumption response to U sufficient for value of UI
  - Overcomes challenge to observe means used to smooth consumption
  - But conditional on knowing preferences
- How well do consumption responses capture value of insurance?
  - Can we simply translate $\Delta$ consumption in $\Delta$ marginal utility?
  - Lack of smoothing: low value? or price high?
  - Huge debate $\Rightarrow$ Unresolved
This Paper:

We have a unique setting in Sweden:

1. **rich admin data** on income, wealth, unemployment, etc
2. **voluntary** UI coverage

We implement three alternative approaches in same setting/sample:

1. Revisit **CB approach** using admin data
   - Study different margins and heterogeneity in consumption responses
2. Propose novel **MPC approach**
   - State-specific MPCs reveal price of smoothing consumption
3. Implement **RP approach** based on UI choices
   - Study heterogeneity in valuations (conditional on unemployment risk)
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2. Propose novel **MPC approach**
   - MPCs indicate high value of UI ($\gtrsim \text{MH costs}$)
3. Implement **RP approach** based on UI choices
   - RP confirms high value of UI and reveals large dispersion
Recent literature on value of UI:

- CB approach using admin data (Ganong and Noel '16, Gerard and Naritomi '18) rather than surveyed consumption (Browning and Crossley '01, Stephens '01)
- ‘optimization methods’ (Chetty '08, Landais '15, Hendren '17)
- other social insurance settings (Finkelstein et al. '15,’17, Low and Pistaferri '15, Cabral '16, Autor et al. '17, Fadlon and Nielsen '17)

Our new approaches relate to:

- heterogeneity in MPCs (e.g., Kreiner et al ’16, Kekre ’17, …)
- RP vs. choice frictions (e.g., Abaluck and Gruber ’11, Handel ’13, Handel and Kolstad ’15, …)

Building on own previous work:

- use CB approach to study optimal dynamics of UI (Kolsrud et al. ’18)
- use UI choices to study adverse selection in UI (Landais et al. ’18)
Worker maximizes:

$$\pi(z) u_u(c_u, x_u) + (1 - \pi(z)) u_e(c_e, x_e) - z$$

subject to

$$c_s = y_s + \frac{1}{p_s} x_s \text{ for } s = e, u$$

Consumption smoothing behavior for $u(c, x) = u(c) - v(x)$:

$$u'_s(c_s) = p_s v'_s(x_s)$$

Examples of resources used to smooth consumption:

- household labor supply: $p_s v'(x_s) = \frac{1}{w_s} c'(x_s)$
- savings/credit: $p_s v'(x_s) = \beta R_s V'_s(R_s a_s - x_s)$
- insurance/securities: $p_s v'(x_s) = p_s V'_0(a_0 - x) / \pi_s$
UI value depends on MRS btw employment and unemployment consumption:

\[ MRS = \frac{u'_u (c_u)}{u'_e (c_e)} \]

MRS “sufficient” to evaluate value of (marginal) changes to UI design

- Baily-Chetty formula:

\[ W'(b) \propto MRS - [1 + \epsilon \frac{\pi}{1-\pi}, b] \]

Envelope conditions are key

- consumption smoothing responses to change in UI have only SO impact on welfare
1 Introduction

2 Conceptual Framework

3 Context & Data

4 Consumption-Based Approach

5 MPC Approach

6 Revealed Preference Approach
Data from tax registers on all earnings/income, transfers/taxes, debt & assets (balance & transactions), some durables

- Consumption as a residual expenditure measure (Kolsrud et al. ’17)

\[
\text{consumption}_t = \text{income}_t - \Delta \text{assets}_t
\]

- Sources of income variation (UI benefits, transfers, asset price shocks)

Data on unemployment outcomes:
- On unemployment spells & benefit receipt
- On determinants of U risk
- On elicited unemployment risk (surveys)

Data on UI coverage choices [2002-2008]
Swedish UI System

- Worker chooses between 2 types of coverage.

  - Basic coverage:
    - mandated and funded by payroll tax
    - provides low, fixed benefit level

  - Comprehensive coverage:
    - workers can voluntary opt for extra coverage
    - pay (uniform) UI premia to UI funds
    - income-related, generous benefit level
    - replacement rate of 80% up to a cap

- We observe the UI choice for universe of Swedish workers (\(\sim 80\%\) buy comprehensive coverage)

More details
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Approach I: Consumption-Based Approach

CB Approach

The MRS equals approximately:

\[
\frac{u'_u (c_u)}{u'_e (c_e)} \approx 1 + \gamma \times \frac{c_e - c_u}{c_e}
\]

where \(\gamma = c_e \cdot u''_e (c_e) / u'_e (c_e)\)

- Approximation relies on Taylor expansion

\[
u' (c_u) \approx u' (c_e) + u'' (c_e) [c_e - c_u]
\]

- Remarkably easy to implement if preferences are known...
- Standard implementation ignores state-dependence \(\theta\)
Yearly Consumption Relative to Year of Displacement

Drop in consumption at $U$

$$\Delta C/C = -12.9\% (.028)$$

- Consumptions relative to event time
  - $-1$
  - $-4$, $-3$, $-2$, $-1$, $0$, $1$, $2$, $3$, $4$

- Years from/to layoff

Identification
- From Annual C to Flow Drops
- NN Matching
- Decomposition
- Heterogeneity

Landais & Spinnewijn (LSE)
Can we translate $\Delta$ consumption in $\Delta$ marginal utility?

- Consumption drops are endogenous:
  - Large $\Delta C$ relative to $\Delta Y$ at displacement $\Rightarrow$ low $\gamma$? or high $p_u/p_e$?
  - Large $\Delta C$ for liquidity or debt-constrained $\Rightarrow$ high $p_u/p_e$?

- Other challenges:
  1. State-dependent Expenditures $\Rightarrow$ relevant $\gamma$?
  2. State-dependent Utility $\Rightarrow$ relevant $\theta$?
  3. Anticipation (e.g. Hendren [2017, 2018])
  4. Heterogeneity (e.g. Andrews & Miller [2013])
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- Other challenges:
  1. **State-dependent Expenditures** $\Rightarrow$ relevant $\gamma$?
  
  Using consumption surveys, we find:
  - committed expenditures (e.g., rent) drop very little
  - durable good consumption (e.g., furniture) drops early on in the spell
  - employment-related, but also leisure expenditures drop substantially
  - increase in home production

  2. **State-dependent Utility** $\Rightarrow$ relevant $\theta$?

  3. **Anticipation** (e.g. Hendren [2017, 2018])

  4. **Heterogeneity** (e.g. Andrews & Miller [2013])
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- Other challenges:
  1. State-dependent Expenditures $\Rightarrow$ relevant $\gamma$?
  2. State-dependent Utility $\Rightarrow$ relevant $\theta$?
     - Complementarities btw $C$ & $L$, reference-dependence, etc.
       $$\frac{u_u'(c_u)}{u_e'(c_e)} \approx [1 + \gamma_e \times \frac{c_e - c_u}{c_e}] \times \theta$$
       $$\theta = \frac{u_u'(c_u)}{u_e'(c_u)} \neq 1?$$
  3. Anticipation (e.g. Hendren [2017, 2018])
  4. Heterogeneity (e.g. Andrews & Miller [2013])
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  1. State-dependent Expenditures $\Rightarrow$ relevant $\gamma$?
  2. State-dependent Utility $\Rightarrow$ relevant $\theta$?
  3. Anticipation (e.g. Hendren [2017, 2018])
     - Drop at $U = $ drop conditional on $U$ risk already revealed at $U$
     - Individuals who end up unemployed were also more risky
     - Anticipation reduces drop in $C$ at $U$

- Solution: Rescale changes in $C$ at job loss by risk revealed
  Or rescale change in $C$ before $U$ by amount of risk revealed before $U$
Can we translate $\Delta$ consumption in $\Delta$ marginal utility?

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  2. State-dependent Utility $\Rightarrow$ relevant $\theta$?
  3. Anticipation (e.g. Hendren [2017, 2018])
  4. Heterogeneity (e.g. Andrews & Miller [2013])
     - Heterogeneity in MRS important for policy design
     - Mapping btw heterogeneity in $\Delta c$ & in MRS is tricky!
     - Need to account for $\text{Cov}(\gamma, \Delta c)$
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Approach II: State-Specific MPC’s

MPC approach

Under ‘regularity conditions’, MRS is bounded by:

\[
\frac{u_u'(c_u)}{u_e'(c_e)} \geq \frac{MPC_u/(1 - MPC_u)}{MPC_e/(1 - MPC_e)}
\]

with \( MPC_s \equiv dc_s/dy_s \).

- **Idea:** smoothing behavior depends on state-specific price of increasing consumption, \( p_s \):

\[
\frac{u_u'(c_u)}{u_e'(c_e)} = \frac{p_u}{p_e} \times \frac{v_u'(x_u)}{v_e'(x_e)}
\]

- In ‘standard’ models: \( \frac{v_u'(x_u)}{v_e'(x_e)} \geq 1 \Rightarrow \frac{u_u'(c_u)}{u_e'(c_e)} \geq \frac{p_u}{p_e} \)

- **Challenge:** what is \( p_u/p_e \)? what is binding margin of adjustment?
**Solution:** state-specific $MPC_s$ reveals state-specific price $p_s$

- MPC is higher when price of increasing consumption is higher

\[
\frac{dc_s}{dy_s} = \frac{p_s \times \frac{\sigma^x_s}{\sigma^c_s}}{1 + p_s \times \frac{\sigma^x_s}{\sigma^c_s}}
\]

- Mitigated by curvature over consumption $c$ vs. used resource $x$

**‘Trick’:** rescaling of $MPC_u$ vs. $MPC_e$

- Takes out impact of relative curvature (e.g., CARA prefs)
- Overcomes challenges to CB approach (e.g., work exps, home prodn)

**Builds on ‘optimization approaches’:**

- Choices (e.g., spousal labor, precautionary savings) reveal value of UI...
- ... but requires the studied margin of adjustment to be binding
**Challenge:** need comparable exogenous & anticipated variation in income when employed vs. unemployed

**Use variation in local welfare transfers**
- Means-tested/categorical transfers
- Regulated at national level, large discretion at municipality ($m$) level

\[
B_{imt} = G_{mt}(X_{it}) - y_{it} \cdot \tau_{mt}(X_{it})
\]

- income guarantee $G$, phase-out rate $\tau$
- income $y_{it}$
- observable characteristics $X$ fixed by law (age of kids, marital status, etc.)

**Large variation across municipalities / over time / across HH types**
Variation in Local Transfers: Across Municipalities

Mean residualized local transfers, by municipality, SEK '000s

- (10,22]
- (5,10]
- (1.5,5]
- (0,1.5]
- (-1.5,0]
- (-5,-1.5]
- (-10,-5]
- [-22,-10]
- N.D.
Mean residualized local transfers for single parent households, difference between bottom and second income quintile, SEK ‘000s

- (0,10]
- (-2.5,0]
- (-4,-2.5]
- (-5,-4]
- (-6,-5]
- (-7,-6]
- (-8.5,-7]
- [-16,-8.5]
- N.D.

Mean residualized local transfers, 2000-2007 growth, SEK ‘000s

- [10,22]
- (5,10]
- (1.5,5]
- (0,1.5]
- (-1.5,0]
- (-5,-1.5]
- (-10,-5]
- [-22,-10]
- N.D.
MPC: Variation in Local Transfers

- Exploit variation in the schedules $G_{mt}(X_{it}) \& \tau_{mt}(X)$
- Residualize transfers
  \[ B_{imt} = \nu_t^0 + \eta_m^0 + X'_{it} \beta + \tilde{B}_{imt} \]
- Correlate consumption with residualized transfers
  \[ C_{imt} = \alpha_i + \nu_t + \eta_m + \mu_e \cdot \tilde{B}_{imt} + \mu_u \cdot \tilde{B}_{imt} \cdot 1[U = 1] + \nu_{imt} \quad (1) \]
- Estimate in FD on sample of individuals who become unemployed
  - Compare them when employed vs unemployed
MPC: Transfer

MPC Unemployed: .551 (.026)  
MPC Employed: .435 (.017)  
MRS: 1.59

First-difference in consumption
-45000  -30000  -15000  0  15000  30000  45000

First-difference in residualized local transfer
0  25000  50000

Details  Additional Evidence - UI benefit kink

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Estimates of MRS: CB vs. MPCs

\[ \gamma = 1 \]

\[ \gamma = 4 \]

\[ 1 + \epsilon \]

KM '02

\[ 1 + \epsilon \]

KLNS '18

MPC Transfer

1.97 (.32)

Marginal Rate of Substitution

CI

MH bounds
Introduction

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MPC Approach

Revealed Preference Approach
Approach III: Revealed Preference Approach

**RP approach**

When offered insurance at the margin ($dc_u / dc_e = -p_e / p_u$), buy if MRS greater than expected price per unit of coverage:

$$\frac{u'_u(c_u)}{u'_e(c_e)} \geq \frac{p_u}{p_e} \times \frac{[1 - \pi]}{\pi}$$

- Most direct approach?
  - When prices are known, could infer value from insurance choice
  - But ex-ante choice: need to account for unemployment risk $\pi$!

- Challenges:
  1. Requires data on choices and unemployment risk
  2. Need variation in ‘expected’ price to tighten bounds
  3. Tackle potential choice frictions: e.g., risk misperception, inertia
Swedish Context:
- Basic coverage \((b_0, \tau_0)\) vs comprehensive coverage \((b_1, \tau_1)\)

\[
\frac{(1 - \pi_i) \times (\tau_1 - \tau_0)}{\pi_i \times (b_1 - b_0)},
\]

- **lowerbound** on MRS for ‘insured’ workers on plan \((b_1, \tau_1)\)
- **upperbound** on MRS for ‘uninsured’ workers on plan \((b_0, \tau_0)\)

Estimation of unemployment risk \(\pi_i\):
- Predict days spent unemployed with rich set of observables (see Landais et al. (2018))
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RP non-param: Bounds on Average MRS

\[ \gamma = 1, \gamma = 4, 1 + \epsilon \]

KM '02, KLNS '18

2002-2006

UNINSURED

INSURED

2002-2006

MPC Transfer

1.97 (.32)

Marginal Rate of Substitution

CI

MH bounds

RP non-param.
Parametric Approach:
- Impose structure on the choice model
- Use risk shifters exogenous to MRS

Estimate logit model of UI coverage choice:
- ‘insured’ if $\underbrace{\text{MRS} - E[P]_{it} + \varepsilon_{it}}_{X'\beta} \geq 0$
- $X$: vector of observables affecting MRS (age, education, income, etc.)

Predict unemployment risk $\pi_i$ based on $X + Z$:
- $Z$: risk shifters ($\perp X$) (relative tenure rank, layoff notifications)
RP Approach: Role of Frictions?

- RP approach relies on EU optimization
  - Assume absence of choice and information frictions
  - e.g., Abaluck and Gruber ’11, Barseghyan et al. ’13, Handel and Kolstad ’15, ...

- Predicted risk $\pi_i = \text{perceived risk } \tilde{\pi}_i$?
  - Private info vs. imperfect info, biased beliefs, salience, etc.
  - Study elicited risk belief in survey matched with our data
    - Little bias on average, but $\text{Corr}(\pi_i, \tilde{\pi}_i) << 1$

- Account in structural estimation for wedge $\pi_i \neq \tilde{\pi}_i$:
  1. Correct for misperception $\hat{\beta}[\pi_i - \tilde{\pi}_i]$ in calculation of expected price
  2. Use salient risk ‘shifters’ (firm layoff rate and worker’s unemployment) to predict risk
Evidence from Elicited Risk Perceptions

**HUS Survey**

$\beta = .31 \ (0.08) \ [w/o \ controls]$  
$\beta = .26 \ (0.07) \ [w. \ controls]$  
$\beta = .27 \ (0.08) \ [CES, \ US]$
Adjusted RP Parametric: MRS distributions

Marginal Rate of Substitution

INSURED 2002-2006

UNINSURED 2002-2006

MPC: 1.59 (.22)  
RP: 2.13 (.02)
MRS distributions vs C drops

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Value of UI
July 2, 2019
Conclusion

- Revisited consumption-implementation using registry-based measure
  - find ‘small’ consumption drops which translate in low value of UI for standard preferences
  - limited consumption smoothing beyond (generous) social transfers

- Alternative approaches suggest high mean and variance in the value of UI
  - high mean: generous UI is desirable
  - high variance: allow for choice or differentiate UI policy
  - need caution when using CB approach to guide policy

- State-specific MPCs seem robust alternative to CB approach & extendible to other social insurance settings when no choice is available
DETAILS
Using a **Zero-Inflated Poisson** model to predict the number of days unemployed in \( t + 1 \).

- **Logit** part of the model predicts excess zeroes using layoff history (layoff dummies in \( t - 1 \) and \( t - 2 \)), notifications (in \( t \), \( t - 1 \) and \( t - 2 \)), average firm layoff probability by year, union membership, individual’s tenure in firm, tenure \( \times \) notification, firm layoff probability \( \times \) tenure, year \( \times \) industry fixed effects and firm size.

- **Poisson count** part of the model predicts length of unemployment spell based on income history (\( \ln(\text{income}) \) in \( t \), \( t - 1 \) and \( t - 2 \)), family type, age bins, gender, education level, region of residence and industry of activity in \( t \).
Predicted risk model: Fit

Less than 20 days

Less than 5 days
Registry-based Measure of Consumption

- Simple idea: consumption as a residual expenditure measure,
  \[ consumption_t = income_t - \Delta assets_t \]

- We use admin data (from tax registers) on earnings \( y \), transfers \( T \), bank savings \( b \), outstanding debt \( d \), other financial assets \( v \) and real assets \( h \).
  - Account for returns from assets and changes in stock value
  - Majority starts unemployment with no financial nor real assets

- We construct annual household consumption \( C \) for panel of Swedish workers and analyze how it evolves around job loss using event-study

- Note that we check consistency with consumption survey data
Consistency with survey data

Log consumption from HUT survey data vs. log consumption from registry data.

- Local fit
- 45 degree line
Consumption Equation

\[ c_t = y_t + T_t + \tilde{c}_t^b + \tilde{c}_t^d + \tilde{c}_t^v + \tilde{c}_t^h \]

- **Bank savings:** \( \tilde{c}_t^b = y_t^b - \Delta b_t \)
  - \( y_t^b \): earned interests; \( \Delta b_t \): change in bank savings

- **Debt:** \( \tilde{c}_t^d = -y_t^d + \Delta d_t \)
  - \( y_t^d \): paid interests; \( \Delta d_t \): change in debt

- **Other financial assets:** \( \tilde{c}_t^v = y_t^v - \Delta v_t \)
  - \( y_t^v \): interests, dividends, price change \( \Delta p_t^v \times q_{t-1}^v \)
  - \( \Delta v_t \): change in stock value \( p_t^v q_t^v - p_{t-1}^v q_{t-1}^v \)

- **Real assets:** \( \tilde{c}_t^h = y_t^h - \Delta h_t \)
  - \( y_t^h \): rent, imputed rent, price change
  - \( \Delta h_t \): change in stock value
Identifying Dynamic Consumption Responses to U

- Event Study Methodology:

\[ Y_{it} = \alpha_i + \nu_t + \sum_{j=-N_0}^{N_1} \beta_j \cdot 1[J_{it} = j] + \varepsilon_{it} \] (2)

- \([-N_0; N_1]\): window of dynamics effects
- \(J_{it} = t - E_{it}\): event time

Potential concern: only identifies \(\beta_j\) up to a trend (cf. Borusyak & Jaravel [2017])

Solution: control group to fully identify \(\nu_t\)
- NN matching based on pre-characteristics
• How to re-cover consumption wedge from yearly aggregates mixing employment and unemployment consumption, \( c_e \) and \( c_u \)?

• Focus on spells ongoing in December, and compute drop by time spent unemployed during the year
From Annual to Flow Drops in Consumption

Parametric estimate of \( \frac{\Delta C}{C} \) at unemployment.

\[ 0.129 (0.028) \]

Estimated drop in Consumption in year 0:

<table>
<thead>
<tr>
<th>Months unemployed in event year 0</th>
<th>Value of UI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
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<td>6</td>
<td></td>
</tr>
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<td>8</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Landais & Spinnewijn (LSE)
How to re-cover consumption wedge from yearly aggregates mixing employment and unemployment consumption, $c_c$ and $c_u$?

Focus on spells ongoing in December, and compute drop by time spent unemployed during the year

Parametric approach nicely fits the non-parametric estimates

\[
\frac{c_c - c_u}{c_c} = \frac{12}{N} \cdot \frac{\Delta C}{C} = .129(.028)
\]

Fully non-parametric approach gives similar results (KLNS [2018])

Similar estimates (but 10 times less precise!) using consumption surveys (KLNS [2018])
From Annual to Flow Drops in Consumption: Selection

Estimated Drop in Log Consumption (Flow)
First 20 weeks (weighted average): $\Delta c_1 = -0.0477 (0.0079)$
After 20 weeks (weighted average): $\Delta c_2 = -0.0958 (0.0158)$

Drop in Annual Consumption Relative to Pre-U
Number of Weeks Unemployed

1-20 wks. 21-40 wks. 41-60 wks. 61-100 wks.
Event Study: Treated vs. NN

![Graph showing treated vs. control values over years]

- **Years to/from event**
  - Values range from -4 to 4 years.

- **Value of UI**
  - Values range from 250,000 to 400,000.

**Lines**:
- **Treated**: Solid black line.
- **Control**: Dotted gray line.

**Legend**:
- **treated**
- **control**
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>P25</th>
<th>P50</th>
<th>P75</th>
<th>P90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross earnings</td>
<td>151</td>
<td>43</td>
<td>134</td>
<td>229</td>
<td>296</td>
</tr>
<tr>
<td>Capital Income</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Disposable Income</td>
<td>148</td>
<td>91</td>
<td>140</td>
<td>186</td>
<td>236</td>
</tr>
<tr>
<td><strong>Net worth</strong> (A+B-C)</td>
<td>162</td>
<td>-52</td>
<td>0</td>
<td>124</td>
<td>617</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>110</td>
<td>-39</td>
<td>0</td>
<td>123</td>
<td>420</td>
</tr>
<tr>
<td><strong>Financial assets</strong> (A)</td>
<td>75</td>
<td>0</td>
<td>4</td>
<td>48</td>
<td>170</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>65</td>
<td>0</td>
<td>4</td>
<td>47</td>
<td>162</td>
</tr>
<tr>
<td>Bank holdings</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>63</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>49</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>55</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>65</td>
</tr>
<tr>
<td>Stocks</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td><strong>Real Estate</strong> (B)</td>
<td>267</td>
<td>0</td>
<td>0</td>
<td>267</td>
<td>888</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>178</td>
<td>0</td>
<td>0</td>
<td>159</td>
<td>511</td>
</tr>
<tr>
<td><strong>Debt</strong> (C)</td>
<td>181</td>
<td>0</td>
<td>50</td>
<td>236</td>
<td>519</td>
</tr>
<tr>
<td>% of disp. income</td>
<td>132</td>
<td>0</td>
<td>37</td>
<td>161</td>
<td>326</td>
</tr>
</tbody>
</table>

Notes: From Kolsrud et al. (2016): sample of individuals observed in December of year \( t \) starting unemployment spell in first 6 months of year \( t+1 \).
Decomposition of Cons. Responses: HH Consumption

![Graph showing estimated change at U, relative to year -1 consumption.]

- Estimated change at U, relative to year -1 consumption:
  - Consumption

- Value of UI

- Details

- Landais & Spinnewijn (LSE)

- July 2, 2019
Decomposition of Cons. Responses: Labor Income

Estimated change at $U$, relative to year $-1$ consumption:

- Consumption
- Earnings (laid-off worker)

Landais & Spinnewijn (LSE)
Decomposition of Cons. Responses: Transfers

Estimated change at U, relative to year -1 consumption

- Consumption
- Earnings (laid-off worker)
- Transfers

Landais & Spinnewijn (LSE)
Decomposition of Cons. Responses: -Δ Assets

Estimated change at U, relative to year -1 consumption:

- Consumption
- Earnings (laid-off worker)
- Transfers
- Consumption out of assets

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Earnings (laid-off worker)</th>
<th>Transfers</th>
<th>Consumption out of assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>0.25</td>
<td>0.5</td>
<td>0</td>
</tr>
</tbody>
</table>

Landais & Spinnewijn (LSE)
Decomposition of Cons. Responses: $\Delta$ Debt

Estimated change at $U$, relative to year -1 consumption:

- Consumption
- Earnings (laid-off worker)
- Consumption out of debts
- Consumption out of assets
- Transfers

Landais & Spinnewijn (LSE)
Decomposition of Cons. Responses: Spousal Earnings

- Estimated change at U, relative to year -1 consumption

- Consumption
- Earnings (laid-off worker)
- Transfers
- Consumption out of debts
- Consumption out of assets
- Spousal earnings
Heterogeneity in Consumption Responses

Age
- 35 to 44
- 45 to 55

Marital status
- Not married

Income
- 3rd quartile
- 2nd quartile
- Richest quartile

Wealth
- 3rd quartile
- 2nd quartile
- Wealthiest quartile

Liquid assets
- Some positive assets
- Top 10%

Debt
- 3rd quartile
- 2nd quartile
- Most indebted quartile

Benefits
- Less than 80% of wage

Marginal monthly drop in consumption in year 0
- Less severe drop
- More severe drop

-.2  -.15  -.1  -.05  0  .05  .1
Consumption surveys: estimated expenditure drops

Note: The graph shows estimates and CIs of DiD coefficients, in regressions with HH-level controls. Log expenditure is averaged pre [-3, -2, -1] and post-event [0, 1, 2, 3]. Control households are created via p-score matching.
Change in risk in 2 years pre-event:
\[ d\pi = 0.0042 (0.0005) \]

Change in C in 2 years pre-event:
\[ \Delta C / C = -0.009 (0.01) \]

Implied MRS:
\[ \gamma = \frac{\Delta C}{d\pi} \]

\[ \gamma = 1: 2.1429 (2.38) \]

Estimated predicted UI risk relative to event time:

Years to/from layoff:
-4, -3, -2, -1, 0, 1, 2, 3
<table>
<thead>
<tr>
<th></th>
<th>First Difference in Household Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>MPC employment</td>
<td>0.439</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
</tr>
<tr>
<td>MPC unemployment</td>
<td>0.609</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
</tr>
<tr>
<td>Lower Bound on MRS</td>
<td>1.973</td>
</tr>
<tr>
<td>SE (bootstrap)</td>
<td>(0.446)</td>
</tr>
<tr>
<td>SE (delta method)</td>
<td>(0.323)</td>
</tr>
<tr>
<td>Residualization:</td>
<td></td>
</tr>
<tr>
<td>$X_{it}$</td>
<td>$\times$</td>
</tr>
<tr>
<td>Municipality FE</td>
<td>$\times$</td>
</tr>
<tr>
<td>Income $\times$ Municipality FE</td>
<td>$\times$</td>
</tr>
<tr>
<td>Family type $\times$ Municipality FE</td>
<td>$\times$</td>
</tr>
<tr>
<td>$# &amp; age child. \times$ Municipality FE</td>
<td>$\times$</td>
</tr>
<tr>
<td>Year $\times$ Municipality FE</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>98,222</td>
</tr>
</tbody>
</table>
RKD: UI Benefits As Function of Daily Wage

Change in slope: -.001 (.00001).

Daily Benefits/Daily Wage
500 600 700 800 900 1000 1100 1200
Daily Wage

Change in slope: -.001 (.00001)
RKD: Drop in Consumption vs Daily Wage

MPC: \( \frac{dC}{db} = -0.53 (0.22) \)

Consumption drop at unemployment

Daily Wage (SEK)

MPC: \( \frac{dC}{db} = -0.53 (0.22) \)

Value of UI

July 2, 2019

Landais & Spinnewijn (LSE)
RKD: Drop in Consumption vs Daily Wage

**MPC:**
\[ \frac{dC}{db} = -.53 (\pm .22) \]

Consumption drop at unemployment

<table>
<thead>
<tr>
<th>Daily Wage (SEK)</th>
<th>Consumption drop at unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>-1.0</td>
</tr>
<tr>
<td>600</td>
<td>-0.9</td>
</tr>
<tr>
<td>700</td>
<td>-0.8</td>
</tr>
<tr>
<td>800</td>
<td>-0.7</td>
</tr>
<tr>
<td>900</td>
<td>-0.6</td>
</tr>
<tr>
<td>1000</td>
<td>-0.5</td>
</tr>
<tr>
<td>1100</td>
<td>-0.4</td>
</tr>
<tr>
<td>1200</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

**MPC:**
\[ \frac{dC}{db} = -.53 (\pm .22) \]
MPC: $dC/db = -0.53 (0.22)$

Consumption drop vs Daily Wage (SEK):

- Consumption drop at unemployment
- Daily Wage (SEK)

RKD Details

Landais & Spinnewijn (LSE)

Value of UI

July 2, 2019
RKD: Estimation

- Validity of RKD setting: see KLNS [2018]

- RKD specification:

\[ \Delta C_i = \beta_0 \cdot (w - k) + \beta_1 \cdot (w - k) \cdot 1[w > k] + \sum_j 1[D = j] + X' \beta \]

- \( \Delta C \): drop in yearly consumption at U (btw event years -1 and 0)
- UI schedule kinked function of daily wage at \( w = k \)

- Control function approach
  - \( D \): duration of U spell in months

- MPC:

\[ \frac{dC}{db} = \frac{\Delta_{w^-,w^+} (\partial \Delta C / \partial w)}{\Delta_{w^-,w^+} (\partial b / \partial w)} = \frac{\hat{\beta}_1}{.8 \cdot 30 \cdot \bar{D}} \]

- Multiply .8 by 30 \( \cdot \bar{D} \) to translate into yearly benefit variation
RKD Robustness: Bandwidth

![Graph showing RKD estimate of MPC against Bandwidth (Daily Wage SEK). The x-axis represents Bandwidth (in SEK) ranging from 100 to 400, while the y-axis represents RKD estimate of MPC ranging from -2.5 to 0.5. The graph indicates a non-linear relationship with the estimate peaking around a Bandwidth of 200-300 SEK.](image-url)
Combining and implicitly differentiating FOC's:

\[
\frac{u'_u(c_u)}{u'_e(c_e)} = \frac{p_u}{p_e} \times \frac{v'_u(x_u)}{v'_e(x_e)} ; \quad c_s = y_s + \frac{x_s}{p_s} ; \quad \frac{dc_s}{dy_s} = \frac{p_s \frac{v''_s}{v'_s} / v'_e}{1 + p_s \frac{v''_s}{v'_s} / v'_u}
\]

‘Regularity’ conditions:

1. \( \frac{v'_u(x_u)}{v'_e(x_e)} > 1 \)
2. \( \frac{v''_u}{v'_u} / \frac{v''_u}{v'_u} = \frac{v''_e}{v'_e} / \frac{v''_e}{v'_e} \)
3. preferences separable in \( c \) and \( x \)
4. interior optimum

Note that bound may be uninformative

- e.g., insurance setting: \( \frac{v'_u(x_u)}{v'_e(x_e)} = \frac{\pi_e}{\pi_u} \gg 1 \)
- in fact, insurance lowers \( p_u/p_e \) below 1 \( \Rightarrow \) simple test for insurance!
Optimization methods

• Well-known idea: individuals’ choices reveal their value for insurance
  • Most obvious/direct case: UI choices
  • Other margins of adjustment: labour supply, search effort, savings, reservation wage, etc.
    • Extend CB approach to wedges in other behavior (Fadlon and Nielsen 2017, Hendren 2017, Finkelstein et al. 2017)
    • Extend CB approach to changes in anticipation of unemployment (Hendren 2017)
    • Study response in unemployment to unemployment benefits vs. other sources of income (Chetty [2008], Landais [2015])

• Optimization approaches require the studied margin of adjustment to be binding or even unique
  • Consumption is encompassing all potential margins of self-insurance
  • MPC reflects the price of the binding margin of self-insurance
Setup:
- Consider contract $z_1 = (b_1, \tau_1)$ and contract $z_0 = (b_0, \tau_0)$
- Denote agent's behavior for contract $z_j$ by $x(z_j)$
- Denote agent's resulting unemployment risk by $\pi(z_j)$ and consumption by $c(z_j)$

Incremental value:
\[
Eu(z_1) - Eu(z_0) = \int_{z_0}^{z_1} Eu'(z) \, dz
\]

Envelope condition:
\[
Eu'(z) \, dz = \pi(z) \frac{\partial u_u(c_u(z), x(z))}{\partial c_u} \, db - (1 - \pi(z)) \frac{\partial u_e(c_e(z), x(z))}{\partial c_e} \, d\tau
\]
using
\[
\frac{\partial \pi}{\partial x} [u_u - u_e] + \pi \frac{\partial u_u}{\partial x} + (1 - \pi) \frac{\partial u_e}{\partial x} = 0
\]

Approximation:
\[
Eu(z_1) - Eu(z_0) \approx \pi(\bar{z}) u_u'(c(\bar{z})) [b_1 - b_0] - (1 - \pi(\bar{z})) u_e'(c(\bar{z})) [\tau_1 - \tau_0]
\]
RP approach: Robustness - Details

- **Self-insurance / Savings:**
  - Presence of alternative means to smooth consumption reduces value of UI
  - Social insurance may crowd-out private insurance
  - Conditional on consumption, private insurance responses have only SO impact

- **Liquidity constraints:**
  - Liquidity or borrowing constraints tend to increase value of UI
  - However, value is still entirely captured by $u'_{cu}$
  - Only when consumption cannot respond (e.g., committed expenditures), $u'_{cu}$ will under-estimate value of UI

- **Moral hazard:**
  - Envelope conditions again apply; individual unaffected by fiscal externality
  - Using $\pi(z_1) > \pi(\bar{z})$ for approximation, we overestimate insurance value and thus RHS provides a (weaker) lower bound
  - Using $\pi(z_0) < \pi(\bar{z})$ for approximation, we underestimate insurance value and thus RHS provides a (weaker) upper bound
Combining CI and RP: Details

- How do approximations for two methods interact?
  - CI approach provides estimate of $MRS|_{z_1}$ and $MRS|_{z_0}$ for insured and uninsured respectively
  - RP approach provides estimates of $MRS|_{\bar{z}}$ for both groups
  - Under risk-aversion, $MRS|_{z_1} \leq MRS|_{\bar{z}} \leq MRS|_{z_0}$
  - Hence, for the insured:
    - RP approach provides a (weaker) lower bound for $MRS|_{z_0}$ ($> MRS|_{\bar{z}}$), but not necessarily for $MRS|_{z_1}$
    - BUT CI approach indicates that $MRS|_{z_0} \leq MRS|_{z_1} + \gamma \frac{\Delta b}{c} \leq 1 + \gamma \left[ \frac{\Delta c + \Delta b}{c} \right]$
    - Using $\Delta b$ as the upper bound on the additional consumption drop when unemployed under $z_0$ rather than $z_1$, we find conservative lowerbound on $\gamma$:
      $$\gamma : \left[ \frac{1 - \pi}{\pi} \cdot \frac{\tau_1 - \tau_0}{b_1 - b_0} - 1 \right] / \left[ \frac{\Delta c + \Delta b}{c} \right]$$
    - Differences in consumption under the two contracts seem small though. So assuming $MRS|_{z_1} \approx MRS|_{\bar{z}} \approx MRS|_{z_0}$ We will investigate this further.

- Selection into unemployment:
  - We estimate the revealed value of insurance for all workers, but the consumption drops only for displaced workers.
  - If expected consumption drops for non-displaced workers would be lower (higher), we are underestimating (over-estimating) $\gamma$
Combining CI and RP (cont’d): Details

- **Within-group heterogeneity:**
  - CI approach over-estimates \( MRS \) if \( corr(\gamma, \frac{\Delta c}{c}) \) is negative. Evidence that the uninsured (with lower \( \gamma \)) have smaller consumption drops goes in the other direction.
  - RP approach would be robust to heterogeneity if we had info on individual risk types \( \pi_i \). Instead, we are using risk-realizations to get average group risks.
  - That is, by using \( \frac{E(1-\pi)}{E(\pi)} \) we are overestimating \( E\left(\frac{1-\pi}{\pi}\right) \) and more so if heterogeneity within-group is important.

- **Eligibility and ex-post risk realizations:**
  - individuals can switch in and out of UI, but need to be contributing for 12 months to be eligible
  - we consider unemployment risk in \( t + 1 \) for individuals making UI choice in \( t \)
  - we restrict sample to individuals who would be eligible when becoming unemployed in \( t + 1 \) (i.e., sufficient earnings and no unemployment in \( t \))
  - this sample restriction + choice of outcome variable reduces estimated unemployment risk relative to average unemployment risk
  - e.g., unemployment risk for our sample is higher in \( t + 2 \), so when they factor in inertia when deciding at \( t \), we would be underestimating the decision-relevant unemployment risk and thus overestimate the MRS
The Swedish UI System: Details (I)

- Eligibility rules for displaced workers:
  - Work requirement to be eligible to any UI coverage (minimum or supplemental):
    - Within the past 12 months have worked more than 6 calendar months at least 80h per month
  - To be eligible to supplemental UI coverage:
    - Fulfill work requirement + have been contributing to a UI-fund for 12 mths prior to layoff

- Quits
  - Cannot receive UI benefits for first 10 weeks of U spell
  - In our data, we can identify quits to control for potential extra moral hazard from quits vs layoffs

- Basic coverage:
  - Fixed daily amount of 320 SEK ($\approx 20\%$ of median daily wage)

- Supplemental coverage:
  - Identical for all UI funds
  - 80\% of daily wage up to cap
  - Daily benefit $= \text{Max}(320, \text{min}(.8 \times \text{daily wage}, 680))$
The Swedish UI System: Details (II)

- Premia determination:
  - Government controls formula for premia of supplemental coverage
  - No price discrimination (by gender, age, etc.)
  - No price differentiation across UI funds (until 2007, limited differentiation after 2007)

- Link between Kassas and Unions:
  - UI funds were historically linked to Unions
  - But not necessary to be member of Union to be member of Kassa
  - Being member of Kassa does not buy Union membership
  - We observe and always control for Union membership in regressions