The Application Frictions in the Unemployment Insurance

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The Unemployment Insurance

UI provides monetary support to "eligible" workers who lose a job through no fault of their own and who are ready, willing and able to work.

- Who is eligible?
  1. Minimum Past Earning Requirement: With sufficient past earning
  2. Effort Requirement: Actively searching. Report weekly

- Features of UI:
  1. The UI take-up rate is around 50% among the eligible.
  2. About 20% of the applications are rejected.

     Data

Main Research Questions

- **How do the eligibility requirements play a role in workers' application decisions and employment decisions?**
- Main Contribution:
  - Understand **who are left out** and who choose to opt out.
    - Application decisions depends on preceived eligibility and the ability to self-insure (Vroman 2009)
  - Consider all workers, not just the eligible
  - UI extensions during the pandemic (CARES Act) relax eligibility requirements

What I do:

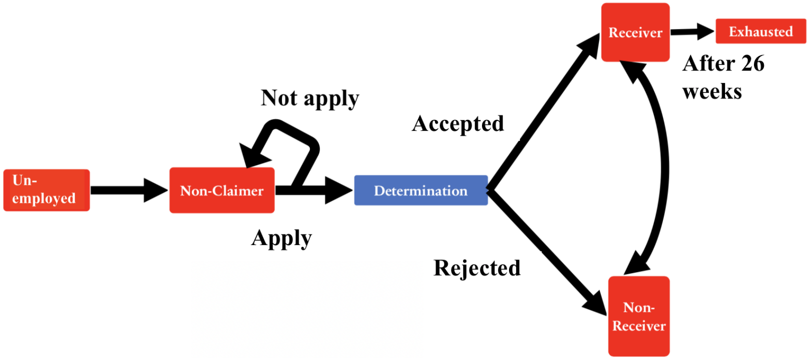
1. **Propose a general equilibrium directed search model (Moen 1997)**
   - Connect employment decision, application decisions with UI status, and saving decisions (ability to self-insure)

2. **Show the model fits the data well**

3. **Use the model to perform counterfactual exercise to evaluate the effect of adjusting eligibility requirements.**

Model - Environment

- Discrete time, infinite horizon, weekly frequency
- Heterogeneous risk-averse worker s= { Productivity, asset, earnings, UI status }
- Worker's main decisions: { Take-up, claiming effort, saving, earnings }
- Homogenous firm post piece-wise wage, and worker choose optimal search direction



Unemployed Worker's Problem – Non-claimer(NC)

$$U_{NC}(\omega, A, z) = max_{\{A',\ell\}} u(c) - \phi(\ell)$$

$$+\beta\{\overbrace{\mathbb{1}_{\{tk=1\}}\,[\underbrace{\xi(\omega,\ell)R_R(\omega',A',z)}_{\text{Accepted}} + \underbrace{(1-\xi(\omega,\ell))R_{NR}(\omega',A',z)}_{\text{Rejected}}]}^{\text{If apply}} + \overbrace{\mathbb{1}_{\{tk=0\}}R_{NC}(\omega',A',z)\}}^{\text{If not apply}}$$

$$s.t.\quad c + A' = (1+r)A + b_n \quad \overbrace{-\mathbb{1}_{\{\ell>0\}}\Phi}^{\text{Initial application cost}} \quad ,$$

- $\xi(\omega, \ell)$**: UI determination Process**

$$\xi = \begin{cases} P(\ell > \underbrace{\bar{\ell} + \epsilon}_{\text{Effort Thrld}}) & \text{, if } \omega \geq \underbrace{\bar{\omega}}_{\text{Past Earning Thrld}} \\ 0 & \text{, } otherwise \end{cases}$$

- R_s: Value of searching given status s

Other unemployed Worker's Problem:

- **Receiver:** $s_U = (\omega, A, z)$

$$U_R(s_U) = max_{\{A',\ell\}} u(c) - \phi(\ell) + \beta\{\overbrace{\lambda R_x(s'_U)}^{\textit{Exhausted}} + (1-\lambda)[\underbrace{\xi(\omega,\ell)R_R(s'_U)}_{\textit{Receive}} + \underbrace{(1-\xi(\omega,\ell))R_{NR}(s'_U)}_{\textbf{Not receive}}]\}$$

$$s.t. \;\; c + A' = (1+r)A + \underbrace{\mathbf{b_r}(\omega)}_{\textbf{UI benefit}}$$

- **Non-Receiver:**

$$U_{NR}(s_U) = max_{\{A',\ell\}} u(c) - \phi(\ell) + \beta\{[\xi(\omega,\ell)R_R(s'_U) + (1-\xi(\omega,\ell))R_{NR}(s'_U)]$$

$$s.t. \;\; c + A' = (1+r)A + \underbrace{\mathbf{b_n}}_{\textbf{Out of labor market income}},$$

Employed Worker's Problem

- States:
  - Emp: $s_E = (w, \omega, A, z)$, $s'_E = (w, \omega', A', z)$
- Value of employment:

$$\begin{aligned} U_E(s_E) = max_{\{A'\}} u(c) + \beta[(1 - \delta(z))U_E(s'_E) + \delta(z)U_U(s'_U)] \\ s.t. \;\; c + A' = w + (1 + r)A \\ \ell \geq 0, A' \geq \underline{A} \end{aligned} \tag{1}$$

Firms

- Value of filled vacancy:

$$J(w,z) = z - w + \beta[\overbrace{\delta(z)V(w,z)}^{\text{Separate}} + \overbrace{(1-\delta(z))J(w,z)}^{\text{Stay}}] \tag{2}$$

- Value of unfilled vacancy:

$$V(w,z) = - \overbrace{\kappa}^{\text{Vacancy Cost}} + \beta\{\overbrace{q(\theta(w,z))J(w,z)}^{\text{Match with Worker}} + \overbrace{[1-q(\theta(w,z))]V(w,z)}^{\text{No Match}}\} \tag{3}$$

One of the Main Difficulties I face:

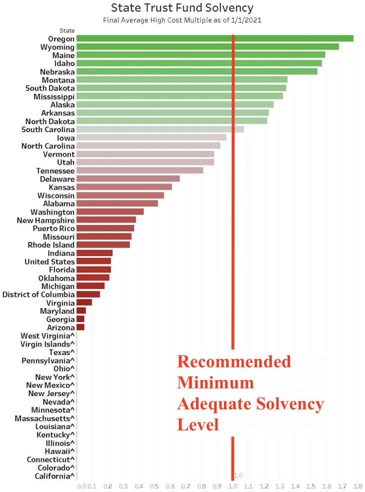
- How to incorporate UI funding system into the model?
  - In order to perform welfare analysis, it is important to also consider government's budget.
  - Rule book v.s. reality

How does UI funding work by the book:

- **Employers** are subjected to incomplete experienced rated UI tax
- Employers on average contribute $0.51 per $100 dollar wage paid
- Each states deposits its revenue into its **Unemployment Trust Fund (UTF)**

However:

- States are not subjected to a balanced budget
- 42/54 are underfunded.
- 18/42 has outstanding advances



What happens if states have no funds?

- States can borrow from the Treasury if they exhaust their reserves and repay within 2-3 years by raising tax rate or by private sector borrowing channels.
- However, states can usually get federal support when bad things happens!
  - Around half of the states declared that they will not increase tax rate! (5/2020)
- UI tax is not sufficient to cover UI payments most of the time.

What I choose to do in my model (for now):

- **Assume UI is funded outside of the states**
  - No taxes on workers nor firms.
  - But, I keep track on government spending on UI when doing policy analysis.
  - Compare policies reforms by their increase in welfare (C.E.) per dollar spends

Pros	Cons
1. Simple to implement	1. Ignore the distributional effect
2. Easy to compute	of taxes on firms/workers
3. Not too far from reality	2. Ad hoc spending on UI

Another Difficulty I face:

- Computational time to solve the model once: 20 sec using VFI
- Perhaps DC-EGM?
  - Continuous choices: search directions(wage), asset, claiming effort
  - Discrete choice: Application decisions

Conclusion

- Propose a model that is suitable to evaluate the effect of adjusting eligibility requirement, yand quantify its welfare cost to the labor market.

  What I found:

  - Eliminating application friction entirely increases welfare by **3.95**%.
  - **Past earning requirement (PER)** accounts for **70**% the above.
    - Among all workers, **low earners** contribute the most.
- Q1: How to incorporate UI funding system into the model?
  - Discrepancy between rule book and reality
- Q2: Possible to ease computational burden using DC-EGM?
  - Three continuous choice + 1 discrete choice

Appendix

Unemployed Workers' Problem – Receivers (R)

- States: $s_U = (\omega, A, z), s'_U = (\omega', A', z)$
- Value of unemployment (R):

$$U_R(s_U) = max_{\{c,A',\ell\}} u(c) - \phi(\ell) + \beta\{\overbrace{\lambda R_x(s'_U)}^{Exhausted} + (1-\lambda)[\underbrace{\xi(\omega,\ell) R_R(s'_U)}_{Receive} + \underbrace{(1-\xi(\omega,\ell)) R_{NR}(s'_U)}_{\text{Not receive}}]\} \tag{4}$$

$$s.t. \quad c + A' = (1+r)A + b_r(\omega)$$
$$\ell \geq 0, A' \geq \underline{A}$$

Unemployed Workers' Problem – Non-Receivers (NR)

- States: $s_U = (\omega, A, z), s'_U = (\omega', A', z)$
- *NR*: Not receiving $(\lambda, \phi = 0)$;

$$
\begin{aligned}
U_{NR}(s_U) = max_{\{c,A',\ell\}} & \, u(c) - \phi(\ell) \\
& + \beta[\underbrace{\xi(\omega,\ell)R_R(s'_U)}_{Receive} + \underbrace{(1-\xi(\omega,\ell))R_{NR}(s'_U)}_{NotReceive}]
\end{aligned}
\tag{5}
$$

$$
\begin{aligned}
s.t. \quad & c + A' = (1+r)A + b_n \\
& \ell \geq 0, A' \geq \underline{A}
\end{aligned}
$$

b_n: Non-labor market income

Unemployed Workers' Problem – Exhausted (X)

- States: $s_U = (\omega, A, z), s'_U = (\omega', A', z)$
- X: exhausted UI $(\lambda, \phi, \xi = 0)$.

$$U_x(s_U) = max_{\{c,A'\}} u(c) + \beta R_x(s'_U)$$

$$\begin{aligned} s.t. \quad & c + A' = (1+r)A + b_n \\ & \ell \geq 0, A' \geq \underline{A} \end{aligned} \tag{6}$$

Employed Worker's Problem

- States:
  - Emp: $s_E = (w, \omega, A, z)$, $s'_E = (w, \omega', A', z)$
  - Unemp: $s_U = (\omega, A, z)$, depends on eligibility & claiming.
- Value of employment:

$$
\begin{aligned}
U_E(s_E) = max_{\{c,A'\}} & u(c) + \beta[(1-\delta(z))U_E(s'_E) + \delta(z)U_U(s'_U)] \\
s.t. \;\; & c + A' = w + (1+r)A \\
& \ell \geq 0, A' \geq \underline{A}
\end{aligned}
\tag{7}
$$

Firms

- States: $s_J = (w, z)$
- Value of filled vacancy:

$$J(s_J) = z - w + \beta[\overbrace{\delta(z)V(s_J)}^{\text{Separate}} + \overbrace{(1-\delta(z))J(s_J)}^{\text{Stay}}] \tag{8}$$

- Value of unfilled vacancy:

$$V(s_J) = -\overbrace{\kappa}^{\text{Vacancy Cost}} + \beta\{\overbrace{q(\theta(s_J))J(s_J)}^{\text{Match with Worker}} + \overbrace{[1-q(\theta(s_J))]V(s_J)}^{\text{No Match}}\} \tag{9}$$

Free Entry and Equilibrium Job-Finding Rates

- Free Entry ($V(s_J) = 0$):

$$\overbrace{q(\theta(s_J))}^{\text{Worker Finding Rate}} = \frac{\kappa}{J(s_J)}$$

$$\overbrace{\theta(s_J)}^{\text{Market Tightness}} = q^{-1}\left(\frac{\kappa}{J(s_J)}\right)$$

- Eqm job finding rate: $p(\theta) = \theta q(\theta)$ determined by J, κ
- Eqm: $\frac{\partial P}{\partial w} < 0$