Optimal Design of Welfare-to-Work Programs

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Optimal Design of Welfare-to-Work Programs

Research agenda developed with:

Nicola Pavoni (Bocconi University)
Optimal Design of Welfare-to-Work Programs

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Nicola Pavoni (Bocconi University)

More recently, joined by:

Ofer Setty (Tel Aviv Univ.) & Conny Wunsch (VU Univ. Amsterdam)
Welfare-to-Work (WTW) programs

• Government programs targeted to the poor & out of work

• Offer income support & promote economic self-sufficiency

• Public insurance - private incentives trade-off

• Programs include a variety of policy instruments
Components of Welfare-to-Work (WTW) programs

- Unemployment Insurance
- Social Assistance: “pure income support”
- Earnings subsidies
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- Transitional Work: “stepping stone” to private sector job
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- Transitional Work: “stepping stone” to private sector job
- Training... not today
Diversity of WTW programs across U.S. states

- 1996 Welfare Reform
Diversity of WTW programs across U.S. states

• 1996 Welfare Reform

• Removed federal authority over structure of programs

• Individual states have flexibility over:
  - design of the WTW program (i.e., mix of policy instruments)
  - generosity of Temporary Assistance for Needy Families
Use of policy instruments across U.S. states

<table>
<thead>
<tr>
<th>State</th>
<th>Inactive</th>
<th>Search</th>
<th>Work</th>
<th>Training</th>
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<tr>
<td>Illinois</td>
<td>0.43</td>
<td>0.03</td>
<td>0.42</td>
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<td>New York</td>
<td>0.84</td>
<td>0.03</td>
<td>0.08</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Source: Department of HHS: Year 2009
Generosity of TANF benefits across U.S. states
Generosity of TANF benefits across U.S. states

Maximum monthly benefits for single parent of 2 children

Source: CLASP: Year 2010
Language

- **Policy**: a prescription of an activity (search, work, train, or rest) to the participant, with an associated conditional transfer

- **WTW program**: a government expenditure program that combines different policies together

- **Generosity** of a WTW program: level of expected utility delivered to the participant (transfers and effort required by activity)

- **Optimal WTW program**: minimizes government expenditures s.t. delivering a given level of ex-ante utility to the participant
Question

How to optimally design a welfare-to-work (WTW) program

- **Approach: dynamic contracting**
  - Shavell-Weiss (1979): private information is job-search effort
Question

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• **Generalization of optimal UI problem**
  - additional technologies ↔ policies
  - human capital ↔ agent heterogeneity
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Which policy instrument is best for whom?
Goal of this talk

Policy Instruments used by the Government

Optimal Design of Welfare-to-Work Programs
Goal of this talk

Skill Level of the Program Participant

Level of Generosity of the Program

- Unemployment Insurance
- Social Assistance
- Job-search Assistance
- Mandatory Work
- Transitional Work

Optimal Design of Welfare-to-Work Programs
Goal of this talk

![Graph showing the relationship between Skill Level of the Program Participant and Level of Generosity of the Program, with Policy Instruments used by the Government and skill depreciation indicated.]
Goal of this talk

Skill Level of the Program Participant

Level of Generosity of the Program

Policy Instruments used by the Government

dynamic provision of incentives

skill depreciation

Optimal Design of Welfare-to-Work Programs
Outline

1. Economic environment

2. Contract between government and unemployed agent

3. Value functions in closed form

4. Characterization of the optimal WTW program

5. How to use the framework for policy evaluation
   (... and another look at the data on US states)
1. **Economic Environment**
Preferences, endowments, and storage

• Agent is infinitely lived with discount factor $\beta \in (0, 1)$

• Intra-period utility: $u(c, a) = \log(c) - a$

  ➤ Consumption $c \geq 0$ and effort $a \in \{0, e\}$
Preferences, endowments, and storage

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- Agent endowed with fixed human capital $h$
Preferences, endowments, and storage

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- Agent endowed with fixed human capital $h$

- Storage with return $R = \beta^{-1}$
Rest, search, and market-sector job

- Rest
  - Low effort \((a = 0)\)
Rest, search, and market-sector job

- **Rest**
  - Low effort \( (a = 0) \)

- **Job search**
  - Job-finding probability: \( \pi(h) \equiv \pi(h, e) > \pi(h, 0) \equiv 0 \)
  - Success of job search \( \rightarrow \) market-sector job
Rest, search, and market-sector job

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  - Low effort \((a = 0)\)

- **Job search**
  - Job-finding probability: \(\pi(h) \equiv \pi(h, e) > \pi(h, 0) \equiv 0\)
  - Success of job search \(\rightarrow\) market-sector job

- **Market-sector job (absorbing state)**
  - Requires high effort \((a = e)\) to produce \(\omega(h) \geq 0\)
Additional technologies

• **Search Assistance**
  
  ▶ At cost $\kappa^A$, agency takes over search on behalf of participant
  
  ▶ Participant saves her search effort
  
  ▶ Agency’s search equally efficient as private search
Additional technologies

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• **Secondary-sector production (“make-work”)**
  ▶ At cost $\kappa^P$, job immediately available (no search friction)
  ▶ Requires high effort $(a = e)$ to produce $\omega \geq 0$
Additional technologies

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  - At cost $\kappa^A$, agency takes over search on behalf of participant
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**Interpretation**: govt. agency / non-profit org. / community service
Information structure

• Observable and contractible:
  ▶ Agent type \( h \)
  ▶ Work effort on market & make-work jobs (e.g., supervised)
  ▶ Saving \( (= 0) \)
Information structure

• **Observable and contractible:**
  
  ▶ Agent type $h$
  
  ▶ Work effort on market & make-work jobs (e.g., supervised)
  
  ▶ Saving ($= 0$)

• **Private information** of the agent and under her control:
  
  ▶ Job-search effort [IC-Search]
  
  ▶ Job offer upon contact [IC-Retention]
2. CONTRACT
Principal-Agent relationship

- Risk neutral principal/government who discounts at rate $R^{-1} = \beta$
Principal-Agent relationship

- Risk neutral principal/government who discounts at rate $R^{-1} = \beta$
- Recursive formulation with states: $(U, h)$ and employment status
Principal-Agent relationship

- Risk neutral principal/government who discounts at rate $R^{-1} = \beta$

- Recursive formulation with states: $(U, h)$ and employment status

- At every pair $(U, h)$, the contract specifies:
  - **Effort level**: $a \in \{0, e\}$
  - **Activity**: assignment to technology
  - **Consumption**: $c$, i.e., welfare benefits/wage tax or subsidy
  - **Continuation utility**: $(U_s, U_f)$ conditional on outcome of search
Options of the contract as policies of WTW program

• Combination of prescriptions on effort $a$ and use of technologies leads to five policy instruments ($i$):

  ➤ **SA**: Social Assistance (rest, $a = 0$)

  ➤ **UI**: Unemployment Insurance (private search, $a = e$)

  ➤ **JA**: Job-search Assistance (assisted search, $a = 0$)

  ➤ **MW**: Mandatory Work (make-work, $a = e$)

  ➤ **TW**: Transitional Work (make-work + assisted search, $a = e$)
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• All other feasible options are not optimal
Options of the contract as policies of WTW program

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$$V(U, h) = \max_{i \in \{SA, UI, JA, MW, TW\}} V^i(U, h)$$
Two types of contract

• Long-term contract:
  
  \[ U^s \geq U \] when job-search succeeds (carrot)

  \[ U^f \leq U \] when job-search fails (stick)
Two types of contract

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• “All carrot-no stick” contract:
  
  ▶ No-Stick constraint on continuation utility:

  $U^f \geq U \implies U^f = U$
Two types of contract

- **Long-term contract:**
  
  - $U^s \geq U$ when job-search succeeds (carrot)
  
  - $U^f \leq U$ when job-search fails (stick)

- “All carrot-no stick” contract:
  
  - **No-Stick constraint** on continuation utility:
    
    $$U^f \geq U \implies U^f = U \implies U \text{ constant along the unemployment spell}$$
Two types of contract

• Long-term contract:
  ▶ $U^s \geq U$ when job-search succeeds (carrot)
  ▶ $U^f \leq U$ when job-search fails (stick)

• “All carrot-no stick” contract:
  ▶ No-Stick constraint on continuation utility:

  $$U^f \geq U \implies U^f = U \implies U \text{ constant along the unemployment spell}$$

  **Bonus I:** Immune to hidden saving
  
  **Bonus II:** Value functions in closed form
3. **Value Functions**

*(All Carrot - No Stick)*
Value functions for all policies

\[ V^i(U, h) = \frac{1}{1 - \beta} \cdot \left[ A^i(h) - B^i(h) \cdot \exp((1 - \beta)U) \right] \]

- \( A^i(h) \): output net of administrative cost \((\kappa^A, \kappa^P)\)
- \( B^i(h) \): cost of promising a unit of \( U \) in \( c \) terms
Value functions for all policies

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**Mandatory Work (MW)**

\[ V^{MW}(U) = \max_c \omega - \kappa^P - c + \beta V^{MW}(U) \]

s.t. : \[ U = \log(c) - e + \beta U \quad (PK) \]
Value functions for all policies

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**Mandatory Work (MW)**

\[ V^{MW}(U) = \max_c \omega - \kappa^P - c + \beta V^{MW}(U) \]

s.t. : 
\[ c = \exp(e) \cdot \exp((1 - \beta)U) \quad (PK) \]
Value functions for all policies

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▸ Mandatory Work (MW)

\[ V^{MW}(U) = \frac{1}{1 - \beta} \cdot \left[ \omega - \kappa^P - \exp(e) \cdot \exp((1 - \beta)U) \right] \]
Returns and costs of each policy

$$V^i(U, h) = \frac{1}{1 - \beta} \cdot \left[ A^i(h) - B^i(h) \cdot \exp((1 - \beta)U) \right]$$

$A^i(h)$: return net of administrative cost

$MW$: $\omega - \kappa^P$

$SA$: 0

$UI$: $\frac{\beta\pi(h)}{1 - \beta + \beta\pi(h)} \omega(h)$

$JA$: $\frac{\beta\pi(h)}{1 - \beta + \beta\pi(h)} \omega(h) - \frac{1 - \beta}{\beta\pi(h)} \kappa^A$

$TW$: $\frac{\beta\pi(h)}{1 - \beta + \beta\pi(h)} \omega(h) + \frac{1 - \beta}{\beta\pi(h)} (\omega - \kappa^P - \kappa^A)$
Returns and costs of each policy

\[ V^i(U, h) = \frac{1}{1 - \beta} \cdot \left[ A^i(h) - B^i(h) \cdot \exp((1 - \beta)U) \right] \]

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\( B^i(h) \): cost of promising \( U \) in \( c \) terms

- **MW**: \( \exp(e) \)
- **SA**: \( 1 \)
- **UI**: \( \exp(e) \times \text{cost of [IC-S]} \)
- **JA**: \( \frac{\beta \pi(h)}{1 - \beta + \beta \pi(h)} \exp(e) \times \text{cost of [IC-R]} \)
- **TW**: \( \exp(e) \)
Returns and costs of each policy

\[ V^i(U, h) = \frac{1}{1 - \beta} \cdot \left[ A^i(h) - B^i(h) \cdot \exp((1 - \beta)U) \right] \]

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**\( B^i(h) \): cost of promising \( U \) in \( c \) terms**

- **MW:** \( \exp(e) \)
- **SA:** 1
- **UI:** \( \exp(e) \times \text{cost of } \left[ U^s \geq U + \frac{e}{\beta \pi(h)} \right] \)
- **JA:** \( \frac{\beta \pi(h)}{1 - \beta + \beta \pi(h)} \exp(e) \times \text{cost of } [IC-R] \)
- **TW:** \( \exp(e) \)
Returns and costs of each policy

\[ V^i(U, h) = \frac{1}{1 - \beta} \cdot [A^i(h) - B^i(h) \cdot \exp((1 - \beta)U)] \]

\[ B^i(h): \text{cost of promising } U \text{ in } c \text{ terms} \]

\[ MW: \quad \exp(e) \]

\[ SA: \quad 1 \]

\[ UI: \quad \exp(e) \times \text{cost of } [U^s \geq U + \frac{e}{\beta \pi(h)}] \]

\[ JA: \quad \frac{\beta \pi(h)}{1 - \beta + \beta \pi(h)} \exp(e) \times \text{cost of } [U^s \geq U] \]

\[ TW: \quad \exp(e) \]
Value functions: UI - SA comparison

\[ V(U, h) = \max_{i \in \{SA, UI\}} \frac{1}{1 - \beta} \cdot \left[ A^i(h) - B^i(h) \cdot \exp((1 - \beta)U) \right] \]
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4. **Optimal WTW Program**
   (h fixed - U fixed)
Optimal WTW program

- **SA**
- **JA**
- **TW**
- **UI**

Promised Utility (U) vs. Human Capital (h)

Optimal Design of Welfare-to-Work Programs
Comparative statics wrt h
Comparative statics wrt $U$

- SA: High utility in private sector job
- JA: High utility in make-work job
- TW: Medium utility in private sector job
- MW: Medium utility in make-work job
- UI: Low utility in private sector job

Human Capital (h) vs. Promised Utility ($U$)

Optimal Design of Welfare-to-Work Programs
Comparative statics wrt labor market conditions \((\pi, \omega)\)

Tight Labor Market
\((\pi, \omega)\) \textbf{high}

Slack Labor Market
\((\pi, \omega)\) \textbf{low}
Comparative statics wrt labor market conditions \((\pi, \omega)\)

- **Tight Labor Market** \((\pi, \omega)\) high
  - **SA**
  - **JA**
  - **MW**
  - **UI**

- **Slack Labor Market** \((\pi, \omega)\) low
  - **SA**
  - **JA**
  - **MW**
  - **UI**

- **Recession**: more \(SA\), but also larger gap \(U^s - U = \frac{e}{\beta \pi(h)}\) in \(UI\)
Comparative statics wrt labor market conditions \( (\pi, \omega) \)

**Tight Labor Market**

\( (\pi, \omega) \) high

**Slack Labor Market**

\( (\pi, \omega) \) low

- **Recession:** more \( SA \), but also larger gap \( U^s - U = \frac{e}{\beta \pi(h)} \) in \( UI \)

- **Policy transitions** as labor market conditions change
Comparative statics wrt effort cost $e$

- Low Effort Cost
  - $e$ low

- High Effort Cost
  - $e$ high
Comparative statics wrt effort cost $e$

Low Effort Cost

- $e$ low

High Effort Cost

- $e$ high

Optimal Design of Welfare-to-Work Programs
Comparative statics wrt effort cost $e$

- High effort demographic groups (e.g., single parents, disabled): more use of JA & SA
5. **Human Capital Depreciation**

*(h moving - U fixed)*
Two implications of $h$ depreciation

1. Wage depreciation ($\omega$)

2. Duration dependence in job-finding rate ($\pi$)
Two implications of $h$ depreciation

1. Wage depreciation ($\omega$)
   - Earnings losses upon displacement...
   - ... increase in the duration of the unemployment spell
     - Mincer-Ofek (1982)

2. Duration dependence in job-finding rate ($\pi$)
Two implications of $h$ depreciation

1. Wage depreciation ($\omega$)
   - Earnings losses upon displacement...
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2. Duration dependence in job-finding rate ($\pi$)
   - Coles-Smith (1998); Kroft-Lange-Notowidigdo (2012)
Two implications of $h$ depreciation

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Key feature of WTW program: transitions across policies
Optimal WTW program with $h$ depreciation
Summary of policy transitions induced by $h$ dynamics

- **Optimal** policy transitions

  1. **High generosity**: $JA \rightarrow SA$

  2. **Low generosity**: $UI \rightarrow TW \rightarrow MW$
Summary of policy transitions induced by $h$ dynamics

- **Optimal** policy transitions

  1. **High generosity**: $JA \rightarrow SA$

  2. **Low generosity**: $UI \rightarrow TW \rightarrow MW$

- However, many transitions can be ruled out as sub-optimal
  - Any transition into $UI$
  - Any transition from $SA$ or $MW$
Summary of policy transitions induced by $h$ dynamics

- **Optimal** policy transitions
  
  1. **High generosity**: $JA \rightarrow SA$
  
  2. **Low generosity**: $UI \rightarrow TW \rightarrow MW$

- However, many transitions can be ruled out as sub-optimal
  
  ▶ Any transition **into** $UI$
  
  ▶ Any transition **from** $SA$ or $MW$

- ... unless $MW$ increases “work experience” (and $h \uparrow$)
6. Dynamic Incentives
(h fixed - U moving)
Dynamic incentives (carrot & stick)

• Full history dependence allowed in the contract

• Technical remark: need to convexify the upper envelope $V(U, h)$
  - lotteries, e.g., Phelan-Stacchetti (2001)
Dynamic incentives (carrot & stick)

- Full history dependence allowed in the contract

- Technical remark: need to convexify the upper envelope $V(U, h)$
  - Lotteries, e.g., Phelan-Stacchetti (2001)

- $U$ allowed to change during unemployment spell
  - Never rises
  - Falls in policies with IC binding: UI and JA

- Some new policy transitions only due to dynamic incentives
Optimal WTW program with dynamic incentives

Optimal Design of Welfare-to-Work Programs
7. Value of Additional Policies (Beyond UI & SA)
Mandatory work as effective threat in WTW programs

- Dynamic incentives and human capital depreciation
- Work effort \textit{higher} than search effort
Mandatory work as effective threat in WTW programs

• Dynamic incentives and human capital depreciation

• Work effort higher than search effort

• Comparison of two WTW programs with same \((U_0, h_0)\):

1. \(UI \rightarrow SA\)
   ▶ Punishment (fall in \(U\)) obtained by decreasing benefits

2. \(UI \rightarrow MW\)
   ▶ Punishment (fall in \(U\)) through threat of future work effort
   ▶ Better intertemporal consumption smoothing
Example

\[ U_t = \log(c_t) - e_t + \beta \mathbb{E}_t[U_{t+1}] \quad (PK) \]
Example

\[ U_t = \log(c_t) - e_t + \beta E_t[U_{t+1}] \]  \hspace{1cm} (PK)

Optimal Design of Welfare-to-Work Programs
Taking stock

Heterogeneity in design of WTW programs ⇒ framework needed

Determinants of the optimal (sequence of) policy instruments:
Taking stock

Heterogeneity in design of WTW programs ⇒ framework needed

Determinants of the optimal (sequence of) policy instruments:

1. Initial budget / ex-ante generosity of the program
2. Skill distribution of the labor force
3. Effort cost of participants (e.g., household type)
4. Labor market conditions
5. Degree of skill depreciation (e.g., occupation, age)
6. Dynamic provision of incentives (e.g., policies with private info?)
8. **Next step on the Agenda:**

**Policy Evaluation**
Policy Evaluation

Quantify cost saving of switching from actual to optimal program
Policy Evaluation

Quantify cost saving of switching from actual to optimal program

1. Parameterization
   • Labor mkt parameters: \( e, \pi, h \) distribution, \( h \) depreciation
   • Costs and returns of technologies: \( \kappa^A, (\kappa^P, \omega) \)
     ▶ Evaluation studies of randomized experiments
Policy Evaluation

Quantify cost saving of switching from actual to optimal program

1. Parameterization

   • Labor mkt parameters: $e, \pi, h$ distribution, $h$ depreciation
   • Costs and returns of technologies: $\kappa^A, (\kappa^P, \omega)$
     ▶ Evaluation studies of randomized experiments

2. Expected utility ($U_0$) and cost ($K_0$) implied by current programs

   • Benefits, time limits, sanctions, exemptions, policies
Policy Evaluation

Quantify cost saving of switching from actual to optimal program

1. Parameterization
   - Labor mkt parameters: $e$, $\pi$, $h$ distribution, $h$ depreciation
   - Costs and returns of technologies: $\kappa^A$, $(\kappa^P, \omega)$
     - Evaluation studies of randomized experiments

2. Expected utility ($U_0$) and cost ($K_0$) implied by current programs
   - Benefits, time limits, sanctions, exemptions, policies

3. Expected cost ($K_0^*$) of optimal WTW program starting from $U_0$
An exploratory look at the data on U.S. states

Prescription of the theory: more inactivity ($SA$) in states with:
An exploratory look at the data on U.S. states

**Prescription** of the theory: more inactivity \((SA)\) in states with:

1. Higher generosity of TANF benefits \(\rightarrow\) high \(U\)

2. Less skilled labor force \(\rightarrow\) low \(h\)

3. Higher unemployment rate \(\rightarrow\) low \(\pi\)

4. More single-parent households with small children \(\rightarrow\) high \(e\)
Optimal Design of Welfare-to-Work Programs
THANK YOU!