Mechansim Design for Social Good

Provision and Targeting for Vulnerable Populations

EC 2020 Tutorial, June 25 and 26 Part 1A

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Goal of this Tutorial

Main Question. You wish to transfer goods, services, or cash those with most need. How do you identify these individuals?

Motivating applications.

- **Social safety nets.** Housing, education, income support, heathcare, job search.
- **Development.** Asset transfers, health interventions, training.

The Stakes

TABLE 2
U.S. Expenditures and Caseloads for Safety Net Programs, 1980 and 2002

	1980			2002	
Cash	Expenditure (1980 billions)	Expenditure (2002 billions)	Caseload (millions)	Expenditure (billions)	Caseload (millions)
Temporary Assistance for Needy Families payments	12.0	26.2	10.6	11.1	5.1
Other TANF services	NA	NA	NA	13.4	NA
Earned Income Tax Credit	2.0	4.4	7.0	35.8	19.8
Total Supplemental Security Income (SSI)	7.9	17.2	4.1	34.6	6.8
SSI for children	NA	NA	[0.2]	[0.5]	[0.9]
Old Age and Disability Benefits	120.5	263.1	30.9	453.8	46.5
OASDI for Children	[10.3]	[22.5]	[3.3]	[20.4]	[3.9]
Unemployment Insurance	14.1	30.8	9.9	51.6	11.7
Health Care					
Total Medicare	35.0	76.4	28.5	256.8	40.0
Total Medicaid	23.3	50.9	21.6	213.5	49.8
Medicaid (dependent children and their adults)	[6.4]	[14.0]	[14.2]	[54.7]	[37.8]
State Child Health Insurance Program	NA	NA	NA	3.0	5.4
Nutrition					
Total Food Stamps	9.2	20.1	21.1	21.7	20.2
Food Stamps—families with children	[5.5]	[12.1]	[12.7]	[11.7]	[10.9]
School Lunch & Breakfast	3.3	7.2	14.9	8.4	22.7
Supplemental Feeding Program for Women, Infants, and Children	0.7	1.5	1.9	4.4	7.5
Housing					
Low-Rent Public Housing	2.2	4.8	NA	8.9	NA
Section 8 & other assisted rental housing	3.1	6.8	NA	20.0	NA
Homeless programs	NA	NA	NA	1.4	NA
Housing Block Grants	NA	NA	NA	1.8	NA
USDA Rural programs	NA	NA	NA	9.3	NA

from Currie and Ghavari, "Transfers in Cash and In-Kind," *JEL* 2008

The Stakes

TABLE 1
PUBLIC EXPENDITURES ON FOUR IN-KIND PROGRAMS, SELECTED OECD COUNTRIES

	Health %GDP 2002	Housing %GDP 2001	Child Care %GDP 2003	Education %GDP 2003	Active Labor Market %GDP 2001
Australia	6.1	0.1	0.4	4.7	0.1
Austria	7.6	0.1	0.6	5.1	0.1
Canada	6.7	..	0.2	5	0.4
Denmark	7.3	0.7	1.6	7.3	0.2
France	7.9	..	1.2	5.2	0.4
Germany	8.4	..	0.4	4.2	0.3
Greece	4.6	..	0.4	3.9	NA
Ireland	5.4	0.5	0.2	4.3	0.4
Japan	6.5	..	0.3	3.3	0.1
Netherlands	5.6	0.4	0.5	4.7	0.4
New Zealand	6.4	0.6	0.4	6.5	0.1
Norway	8.2	0.2	1	7.1	NA
Portugal	6.5	..	0.8	5.3	0.1
Spain	5.2	0.2	0.6	3.8	0.4
Sweden	7.7	..	1.2	7	0.2
United Kingdom	6.4	1.5	0.6	5	NA
United States	6.6	..	0.6	5.3	0.2

from Currie and Ghavari, "Transfers in Cash and In-Kind," *JEL* 2008

Goals of this tutorial

Main Question. You wish to transfer goods, services, or cash those with most need. How do you identify these individuals?

Part 1: Classical toolbox.

- Why target?
- Standard approaches.
- Theoretical groundwork.

Part 2: Beyond the standard theory.

- Behavioral considerations.
- Algorithmic issues in information acquisition.

Framing the issue

We assume the following are relatively fixed:

- Population being screened.
- Resources available for provision.

Broader issues we avoid: Merits of universalism, role of development

We consider variation based on:

- **Objective.**
  - Social welfare. Maximize function of population utilities.
  - Takeup. Maximize provision to intended recipients.
- **Cash vs In-Kind.**

Targeting Toolbox

Approach	Examples
(Proxy) Means Testing	SNAP, EITC

Means Testing.

- Observe income from tax data.
- Provide to low-income individuals.

Targeting Toolbox

Approach	Examples
(Proxy) Means Testing	SNAP, EITC, Progresa

Proxy Means Testing.

- Infer income from ????
- Provide to low-income individuals.

Targeting Toolbox

Approach	Examples
(Proxy) Means Testing	SNAP, EITC, Progresa
Categorical	Medicare, Geogr. Targeting

Categorical Targeting. Provide to those w/ certain obvious features.

Targeting Toolbox

Approach	Examples
(Proxy) Means Testing	SNAP, EITC, Progresa
Categorical	Medicare, Geogr. Targeting
Community-Based	Faith-Based, Development

Community-Based Targeting. Devolve targeting to local decisionmakers.

Targeting Toolbox

Approach	Examples
(Proxy) Means Testing	SNAP, EITC, Progresa
Categorical	Medicare, Geogr. Targeting
Community-Based	Faith-Based, Development
Self-Targeting	Public Housing, Forms

Self-Targeting. Impose costs on receipt that discourage non-needy.

Hybrid Approaches

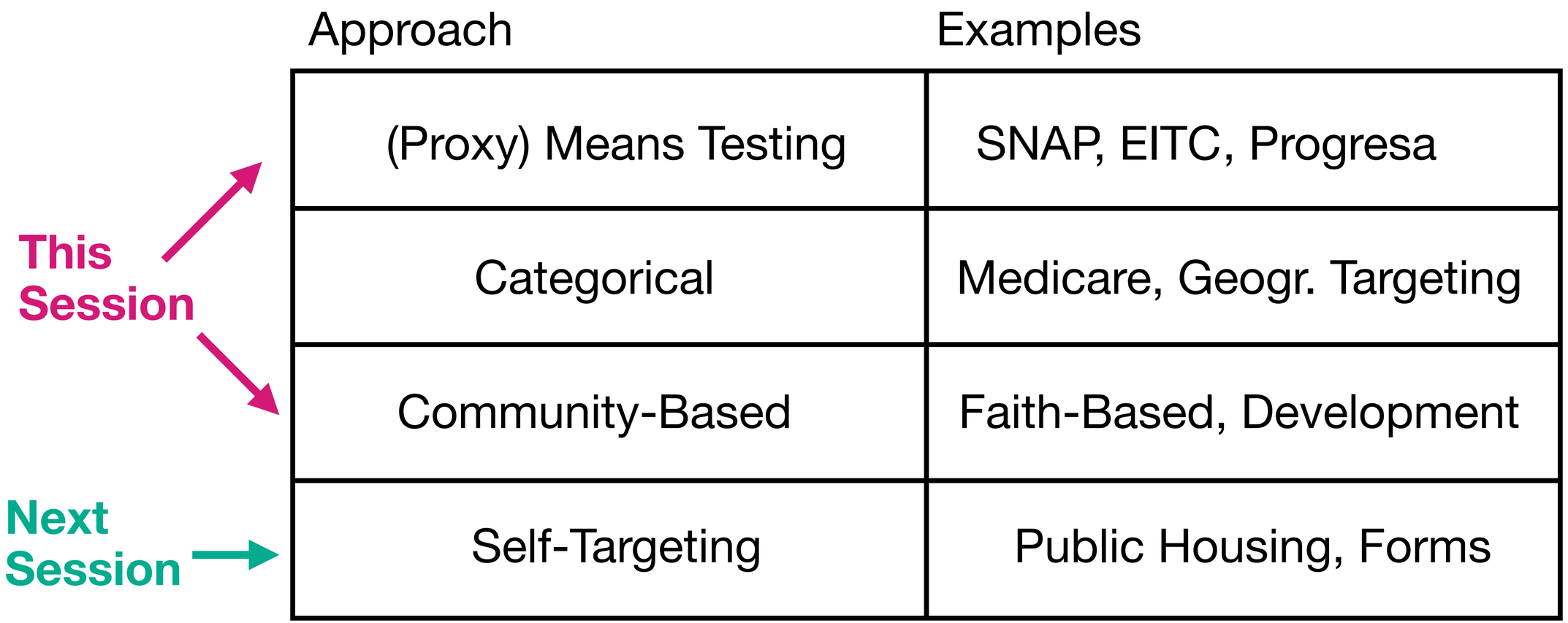
Example 1: US Social Security Disability Insurance

- Extensive paperwork/interview. (ordeal)
- 5-month waiting period w/ no gainful employment. (ordeal/means)
- Screening based on medical history. (proxy means/categorical)

Example 2: Indonesian Poverty Relief

- [Alatas et al. *JPE* 2016] Travel requirement, then PMT. (ordeal)
- [Alatas et al. *AER* 2012] Community meeting, then PMT. (CBT)

Targeting Toolbox



Can we do this with markets?

[Currie and Ghavari et al. *JEL* 2008]

Simple Setup:

- Two goods: g (education) and x (cash)
- Mass π^h of high-wealth individuals, π^l low-wealth individuals.
- Wealths: $W^h > W^l$
- Cobb-Douglas Utilities: $u(g^i,x^i) = \log g^i + \log x^i$

Welfare Objective: $\pi^h u(g^h,x^h)+\pi^l u(g^l,x^l)$

Production costs: Every unit of g costs p units of cash.

First-Best: Redistribute wealth. All individuals consume W/2 cash, W/2p education.

average wealth

Can we do this with markets?

[Currie and Ghavari et al. *JEL* 2008]

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Consumption w/o redistribution:

Type i consumes $W^i/2$ cash, $W^i/2p$ education.

Observations:

- Socially suboptimal.
- First-order conditions: $\dfrac{\partial u(g^i,x^i)/\partial g^i}{\partial u(g^i,x^i)/\partial x^i} = p$ ⇒ Identical willingness to pay.
- But! $\partial u(g^l,x^l)/\partial g^l > \partial u(g^h,x^h)/\partial g^h$ ⇒ Distinct marginal utilities.

Can we do this with markets?

[Currie and Ghavari et al. *JEL* 2008]

Takeaways:

- Redistributive power based only on wtp is constrained.
- If prices are all you have: [Dworczak et al. EC 2018]
- Investment in (costly) targeting might be worthwhile.

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- First-order conditions: $\frac{\partial u(g^i,x^i)/\partial g^i}{\partial u(g^i,x^i)/\partial x^i} = p$ ⇒ Identical willingness to pay.

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Redistribution In Kind

[Currie and Ghavari et al. *JEL* 2008]

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Cobb-Douglas Utilities: $u(g^i,x^i) = \log g^i + \log x^i$

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Redistribution In Kind

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Wealths: $W^h > W^l$

Cobb-Douglas Utilities: $u^l(g^l,x^l) = \log g^l + \log x^l$

$u^h(g^h,x^h,g^l) = \log g^h + \log x^h$ + .1 log g^l — externality

Welfare Objective: $\pi^h u^h(g^h,x^h,g^l)+\pi^l u^l(g^l,x^l)$

Observations:

- In new first-best outcome, g^l is higher.
- New first-best cannot be implemented with cash transfers.
- New first-best can be implemented with targeted education transfer.

Proxy Means Testing

Setup: Binary classification of “eligible/ineligible” based on current consumption/income levels.

Main Question: How do you learn who is who?

With Tax Data: Easy. Means test.

Without Tax Data: Predict consumption based on observable features.

Example: Indonesian Poverty Relief

[Alatas et al., JPE 2016]

PKH Program: Targeted cash transfers to those below 80% of poverty line.

- Approximately $130 (~10% of yearly income)
- Conditional* on school attendance, health take-up

Stage 1: Regression

Data: Indonesian National Socioeconomic Survey

- Administered to subpopulation.
- Detailed survey measuring:
  - consumption
  - fine-grained lifestyle

Ex Relief

PKH Pro poverty line.

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Stage 1: I

Data: Indo

- Administe
- Detailed s
  - (
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ONLY FOR THOSE AGED 10 YEARS OR OVER

18. Do you have trouble doing the following daily activities?

Easy 1 Difficult 2 Imposible 3

a. Serve your own meal		d. Taking a trip alone	
b. Light housework			
c. Buying things/ shop		e. Hard housework	

19. How long have the impairment/handicap in Q.17 and Q.18 been going on?

..... months

20. Did you smoke last month?

Yes, every day 1
Yes, occasionally 2 → [to Q.23]
Not smoking 3

21. Did you smoke before?

Yes, every day 1
Yes, occasionally 2
Not smoking 3 → [to Q.27]

22. How long have you stopped smoking?

..... months

23. How many cigarettes do you smoke every day?

..... cigarettes

24. Your usual kind of cigarettes?

White filtered	1	Cigar	5
White unfiltered	2	Self-rolled	6
Clove filtered	3	Incense	7
Clove unfiltered	4	Pipe	8

25. Do you often smoke while at home?

Yes 1 No 2

30. Sports classification:

Light (walking, billiard)	1
Moderate (volley, pingpong, gymnastics)	2
Rather strenuous (mountain biking, jogging)	3
Strenuous (tennis, badminton, football)	4
Very strenuous (rowing, basketball, weightlifting)	5

31. Your work/physical activity is considered:

Light 1 Moderate 2 Heavy 3

FOR ALL HOUSEHOLD MEMBERS AGED 15 YEARS AND OVER

32. Did you drive or ride (as passenger) a motor cycle along public road during the last 12 months?

Yes 1 No 2 [to Q.34]

33. If Q.32 = 1, did you wear a helmet?

Always	1	Occasionally	3
Often	2	Never	4

34. Number of sisters of the same mother who have ever married (including those who had died)

35. Number of sisters of the same mother still living:

36. Number of sisters of the same mother who had died:

37. If Q.36 is nonzero, how many died during pregnancy, maternity, or 40 days after pregnancy termination:

38. Name of that who died corresponding to Q.37 ....

39. Month and year of death

Example: Indonesian Poverty Relief

[Alatas et al., JPE 2016]

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Stage 1: Regression

Data: Indonesian National Socioeconomic Survey

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- Detailed survey measuring:
  - consumption
  - household traits

regression ⇨

Formula predicting consumption in terms of subset of variables.

- high explanatory power
- easy to measure
- costly to manipulate

Example: Indonesian Poverty Relief

[Alatas et al., JPE 2016]

PKH Program: Targeted cash transfers to those below 80% of poverty line.

- Approximately $130 (~10% of early income)
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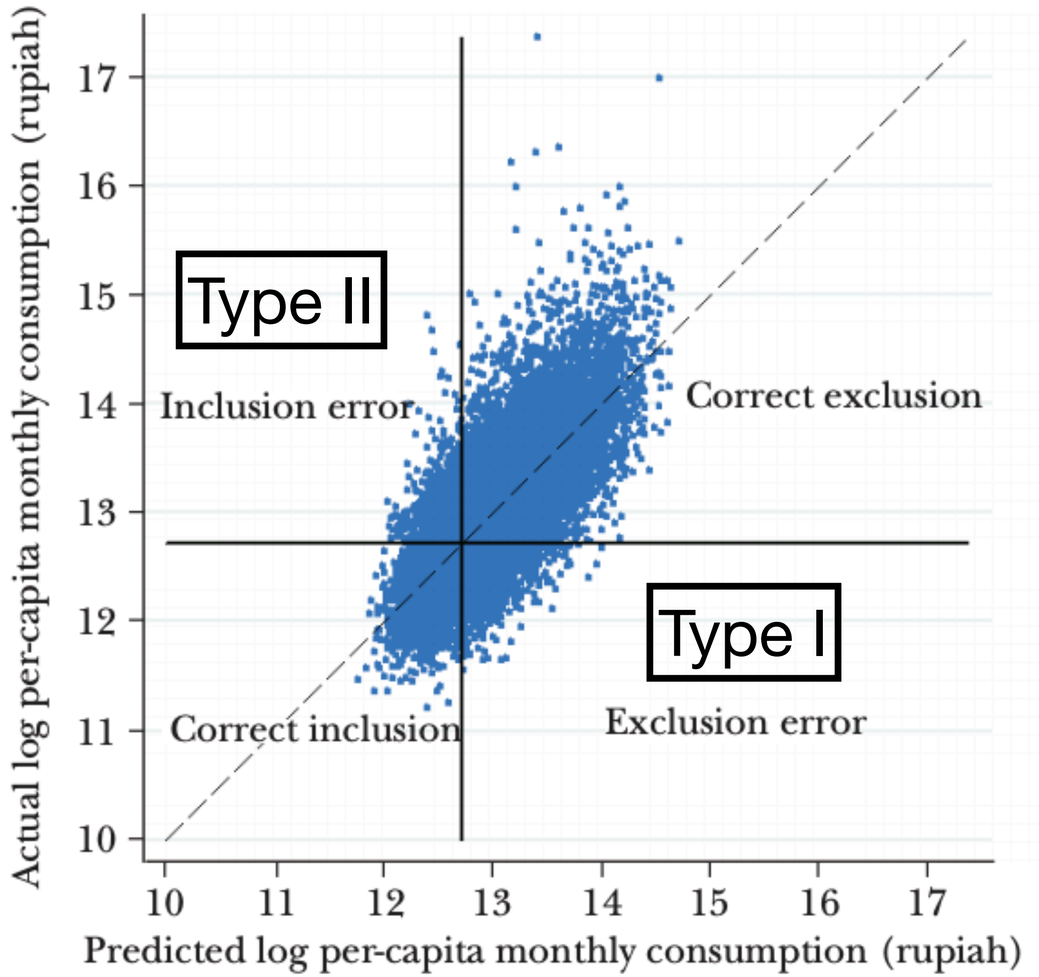
Stage 1: Regression

Stage 2: Eligibility Determination

- Surveyors door to door.
- Universal examination.

Administrative cost per year per recipient: ~$24

Challenge: Prediction Error



[Hanna and Olken, *Journal of Economic Perspectives* 2018]

Community-Based Targeting

Approach: Devolve the selection process to local agents

Idea: An individual's community has more information about them

How this can look:

- Local leaders [Alderman, *JPE* 2002]

  Example: Albanian National Assistance
  - block grants to each commune
  - rough formula from landholdings
  - adjusted by commune council

Community-Based Targeting

Approach: Devolve the selection process to local agents

Idea: An individual's community has more information about them

How this can look:

- Local leaders [Alderman, *JPE* 2002]
- Informant-based wealth ranking [Adams et al., *WD* 1997]
  - ~5 informants selected (various ways)
  - group clarifies poverty definition
  - group ranks members in community

Community-Based Targeting

Approach: Devolve the selection process to local agents

Idea: An individual's community has more information about them

How this can look:

- Local leaders [Alderman, *JPE* 2002]
- Informant-based wealth ranking [Adams et al., *WD* 1997]
- Community meetings [Alatas et al., *AER* 2012]
  - open-invitation community meeting
  - group clarifies poverty definition
  - group ranks members in community

participatory wealth ranking

Active Methods, Summarized

Proxy Means Testing: Infer income from household traits.

Community Based Targeting: Have community report income.

[Alatas et al., *AER* 2012]

[Karlan and Thuysbaert, *World Bank Econ. Rev.* 2019]

Comparing PMT and CBT: Comparable on cost and accuracy.

What's Ahead

Part IB: Economics of Self-Targeting

Part 2: Behavioral and Algorithmic Considerations

- manipulation of means tests
- what is the community measuring?
- how is the community learning?

Q+A