

Good Markets (Really Do) Make Good Neighbors

Scott Duke Kominers

Society of Fellows, Harvard University

(First!) Workshop on Mechanism Design for Social Good
ACM Conference on Economics and Computation
June 26, 2017

Today (I) – Backdrop

*[. . .] My apple trees will never get across
And eat the cones under his pines, I tell him.
He only says, "Good fences make good neighbours."
Spring is the mischief in me, and I wonder
If I could put a notion in his head:
"Why do they make good neighbours? Isn't it
Where there are cows? But here there are no cows.
Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offence.
Something there is that doesn't love a wall,
That wants it down." [. . .]*

(Robert Frost, "Mending Wall")

Today (I) – Backdrop

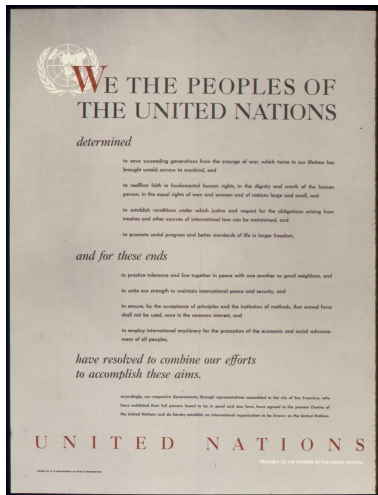
*[...] My apple trees will never get across
And eat the cones under his pines, I tell him.
He only says, "Good fences make good neighbours."
Spring is the mischief in me, and I wonder
If I could put a notion in his head:
"Why do they make good neighbours? Isn't it
Where there are cows? But here there are no cows.
Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offence.
Something there is that doesn't love a wall,
That wants it down." [...]*

(Robert Frost, "Mending Wall")

Today (II) – Outline

- ➊ Introduction to Market Design
- ➋ Typology of Applications
- ➌ Two Case Studies
 - Refugee Resettlement (Delacrétaz–K.–Teytelboym)
 - Healthcare Data Exchange (Kho–Cashy–...–Boehnke–Humphries–K.–...)

Today (III) – An Auspicious Day



Charter of the United Nations

signed on June 26, 1945

What is Market Design? (I)

What is Market Design? (I)

Application of economic principles (and AGT, OR, ...) to the design (or re-design) of market institutions.

What is Market Design? (I)

Application of economic principles (and AGT, OR, ...) to the design (or re-design) of market institutions.

- translating economic theory and analysis into practical solutions to real-world problems

What is Market Design? (I)

Application of economic principles (and AGT, OR, ...) to the design (or re-design) of market institutions.

- ~> translating economic theory and analysis into practical solutions to real-world problems
- ~> key margins:
 - ① *rules* governing which types of transactions may occur
 - ② *infrastructure* for facilitating transactions

What is Market Design? (II)

Theory \longrightarrow Practice \longrightarrow Evaluation

What is Market Design? (II)

Theory \longrightarrow Practice \longrightarrow Evaluation

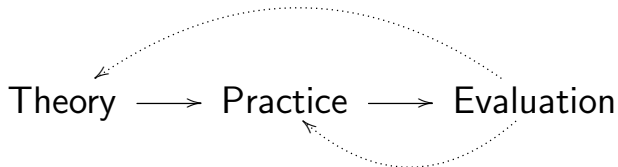
What is Market Design? (II)

Theory \longrightarrow Practice \longrightarrow Evaluation

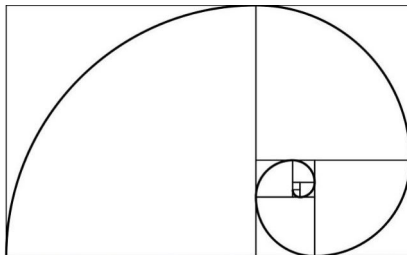
What is Market Design? (II)

Theory \longrightarrow Practice \longrightarrow Evaluation

What is Market Design? (II)



What is Market Design? (III)



Outline

- ➊ Introduction to Market Design
- ➋ Typology of Applications
- ➌ Two Case Studies
 - Refugee Resettlement (Delacrétaz–K.–Teytelboym)
 - Healthcare Data Exchange (Kho–Cashy–...–Boehnke–Humphries–K.–...)

Outline

- ➊ Introduction to Market Design
- ➋ Typology of Applications
- ➌ Two Case Studies
 - Refugee Resettlement (Delacrétaz–K.–Teytelboym)
 - Healthcare Data Exchange (Kho–Cashy–...–Boehnke–Humphries–K.–...)

(Some) Types of Market Design Interventions

(Some) Types of Market Design Interventions

① Marketplace Mechanism (Re-)Design

(Some) Types of Market Design Interventions

- 1 Marketplace Mechanism (Re-)Design
- 2 Information Provision

(Some) Types of Market Design Interventions

- 1 Marketplace Mechanism (Re-)Design
- 2 Information Provision
- 3 (Re-)Shaping the Extensive Margin

(Some) Types of Market Design Interventions

- 1 Marketplace Mechanism (Re-)Design
- 2 Information Provision
- 3 (Re-)Shaping the Extensive Margin
- 4 Market Creation

Marketplace Mechanism (Re-)Design

A marketplace exists, but it does not achieve welfare/distributional goals.

- “Classical” market design – often in circumscribed contexts.
- The welfare function and other design goals are often determined by policymakers and/or market makers; we act as engineers.

e.g. school choice system redesign; implementation of affirmative action programs; organizing refugee resettlement systems; design of public housing allocation mechanisms; coordination of adoption exchanges. . . .

Information Provision

Participants in the market have unequal information (and/or unequal incentives for information acquisition).

- Goal: Change the information flow, to equalize or rebalance.
 - The market organizer may need to assemble information upfront. . . but some mechanisms do provide efficient information acquisition incentives.
 - Uninformedness is a big issue—agents need to understand that information is available, and how to use it.

e.g. entry-level job certification; reporting school quality; mapping nutrition/health resources. . . .

(Re-)Shaping the Extensive Margin

A market(place) exists, but agents do not participate (or wholly lack access).

- Solutions often start with ethnography:
 - *Where in the pipeline does participation breakdown? And what is the source of friction?*
- Some Common Causes:
 - transaction costs,
 - historical exclusion,
 - unawareness of the market,
 - inability to locate/define participants.

e.g. digitization; public healthcare exchanges; land (re-)allocation; alternate college access channels. . . .

Market Creation

The market is “missing” somehow—often via failure of coordination or pricing.

- Often associated with “trivial” first-order theory...
 - *“There’s a good that’s being thrown out; other people want it; all we need is a conduit (with prices)!”*
- ...yet “practical” theory can be subtle.
 - *“So why hasn’t a market emerged?”*

e.g. supplying food banks; data exchanges; youth summer employment programs; teacher allocation systems; natural capital markets. . . .

Outline

- ➊ Introduction to Market Design
- ➋ Typology of Applications
- ➌ Two Case Studies
 - Refugee Resettlement (Delacrétaz–K.–Teytelboym)
 - Healthcare Data Exchange (Kho–Cashy–...–Boehnke–Humphries–K.–...)

Outline

- ➊ Introduction to Market Design
- ➋ Typology of Applications
- ➌ Two Case Studies
 - Refugee Resettlement (Delacrétaz–K.–Teytelboym)
 - Healthcare Data Exchange (Kho–Cashy–...–Boehnke–Humphries–K.–...)

Refugee Matching – Why, What? (Delacrétaz–K.–Teytelboym)

Refugee Matching – Why, What? (Delacrétaz–K.–Teytelboym)

Record number of forcibly displaced people around the world.

- ~70,000 refugees to be resettled in US in 2017
- 20,000 Syrians in UK between 2015 and 2020

Refugee Matching – Why, What? (Delacrétaz–K.–Teytelboym)

Record number of forcibly displaced people around the world.

- ~70,000 refugees to be resettled in US in 2017
- 20,000 Syrians in UK between 2015 and 2020

Initial resettlement areas matter for economic outcomes.

- Key factors: {local communities, labor market, education, ...}.
- Not all resettlement positions currently utilized(!).

Refugee Matching – Why, What? (Delacrétaz–K.–Teytelboym)

Record number of forcibly displaced people around the world.

- ~70,000 refugees to be resettled in US in 2017
- 20,000 Syrians in UK between 2015 and 2020

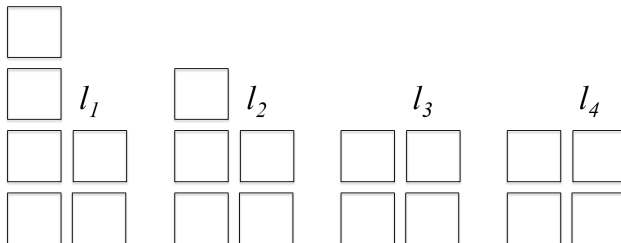
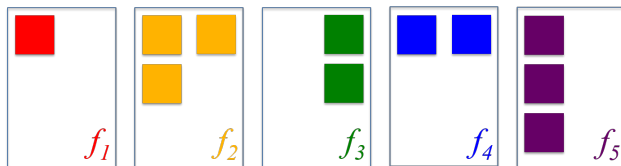
Initial resettlement areas matter for economic outcomes.

- Key factors: {local communities, labor market, education, ...}.
- Not all resettlement positions currently utilized(!).

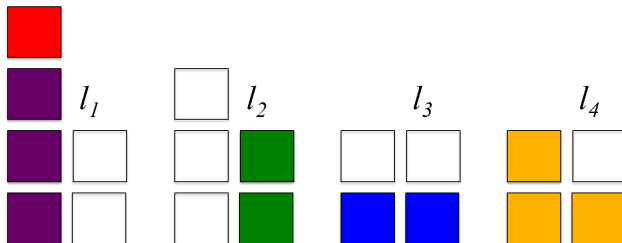
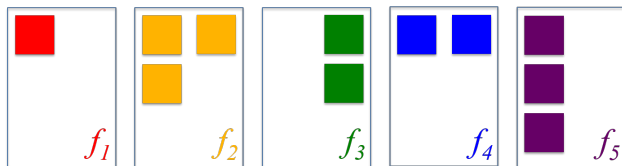
DESIGN GOAL: A matching system that

- incorporates refugees' and localities' preferences while
- respecting local service/resource constraints – and
- hopefully leading to more supply of resettlement places!

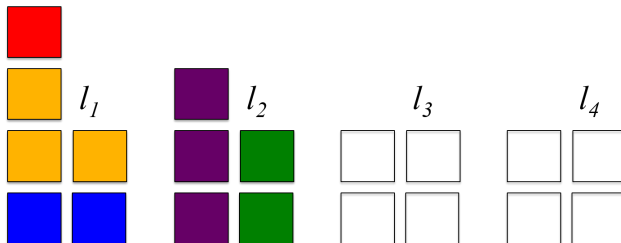
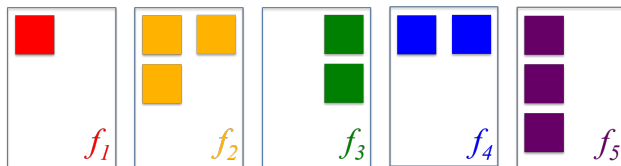
Refugee Matching – What? (II) (Delacrétaz–K.–Teytelboym)



Refugee Matching – What? (II) (Delacrétaz–K.–Teytelboym)



Refugee Matching – What? (II) (Delacrétaz–K.–Teytelboym)



Refugee Matching – How? (Delacrétaz–K.–Teytelboym)

We develop a matching model with combinatorial constraints.

↪ lots of complementarities ☹

Refugee Matching – How? (Delacrétaz–K.–Teytelboym)

We develop a matching model with combinatorial constraints.

↪ lots of complementarities ☹

We offer mechanisms for different institutional contexts.

- “multidimensional” variant of Top Trading Cycles. . .
- custom stability concept; Deferred Acceptance generalizations. . .

Refugee Matching – How? (Delacrétaz–K.–Teytelboym)

We develop a matching model with combinatorial constraints.

↪ lots of complementarities ☹

We offer mechanisms for different institutional contexts.

- “multidimensional” variant of Top Trading Cycles. . .
- custom stability concept; Deferred Acceptance generalizations. . .

Still TONS to be done!

(see, e.g., Aziz–Chen–Gaspers–Sun, 2017)

Refugee Matching – How? (Delacrétaz–K.–Teytelboym)

We develop a matching model with combinatorial constraints.

↪ lots of complementarities ☹

We offer mechanisms for different institutional contexts.

- “multidimensional” variant of Top Trading Cycles. . .
- custom stability concept; Deferred Acceptance generalizations. . .

Still TONS to be done!

(see, e.g., Aziz–Chen–Gaspers–Sun, 2017; **anyone know blockchain?**)

Refugee Matching – How? (II) (Jones–Teytelboym–...)



Refugee Matching – How? (II) (Jones–Teytelboym–...)



\pause

The Chicago HealthLNK (I) – Who, Where, When?



Issues More Content ▼ Publish ▼ Purchase Alerts About ▼ All Journal of the An Advanced Search



Volume 22, Issue 5
September 2015

Article Contents

Abstract

BACKGROUND AND
SIGNIFICANCE

METHODS AND MATERIALS

RESULTS

DISCUSSION

LIMITATIONS

Design and implementation of a privacy preserving electronic health record linkage tool in Chicago ^{FREE}

Abel N Kho, John P Cashy, Kathryn L Jackson, Adam R Pah, Satyender Goel, Jörn Boehnke, John Eric Humphries, Scott Duke Kominers, Bala N Hota, Shannon A Sims, Bradley A Malin, Dustin D French, Theresa L Walunas, David O Meltzer, Erin O Kaleba, Roderick C Jones, William L Galanter

J Am Med Inform Assoc (2015) 22 (5): 1072-1080. DOI: <https://doi.org/10.1093/jamia/ocv038>

Published: 23 June 2015 Article history ▼

Views ▼ PDF Cite Permissions Share ▼

Abstract

Objective To design and implement a tool that creates a secure, privacy preserving linkage of electronic health record (EHR) data across multiple sites in a large metropolitan area in the United States (Chicago, IL), for use in clinical research.

Methods The authors developed and distributed a software application that performs standardized data cleaning, preprocessing, and hashing of patient identifiers to remove all protected health information. The application creates seeded hash code combinations of patient identifiers using a Health Insurance Portability and Accountability Act compliant SHA-

The Chicago HealthLNK (II) – What? (Kho-Cashy-..., 2015)

Patients may receive care at multiple healthcare institutions.

- “Single-site” and “multi-site-query” studies may under- or over-represent {number of patients, extent of treatment, ...}.

The Chicago HealthLNK (II) – What? (Kho–Cashy–... , 2015)

Patients may receive care at multiple healthcare institutions.

→ “Single-site” and “multi-site-query” studies may under- or over-represent {number of patients, extent of treatment, ...}.

But the Health Insurance Portability and Accountability Act (HIPAA) imposes health information protections that make sharing data hard.

The Chicago HealthLNK (II) – What? (Kho–Cashy–... , 2015)

Patients may receive care at multiple healthcare institutions.

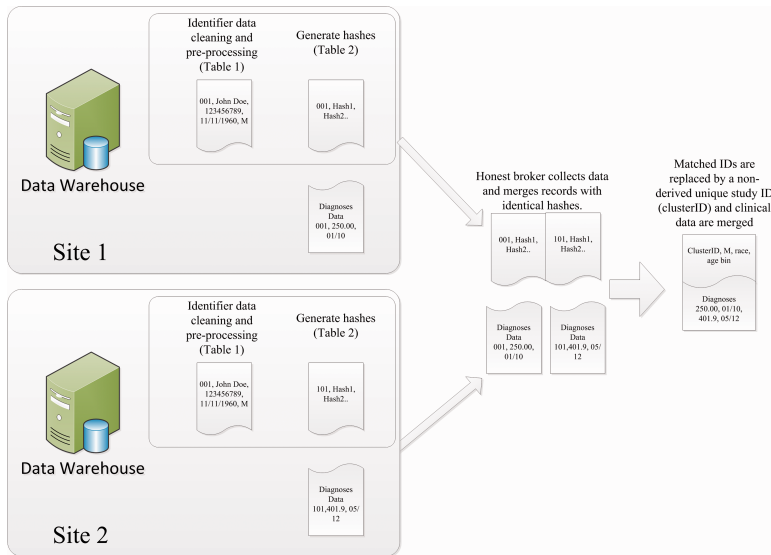
- “Single-site” and “multi-site-query” studies may under- or over-represent {number of patients, extent of treatment, ...}.

But the Health Insurance Portability and Accountability Act (HIPAA) imposes health information protections that make sharing data hard.

DESIGN GOAL: A data exchange that

- preserves HIPAA protections and
- incentivizes participation (and makes participation safe).

The Chicago HealthLNK (III) – How? (Kho–Cashy–... , 2015)



The Chicago HealthLNK (IV) – Why? (Kho-Cashy-. . . , 2015)

Numbers of patients identified with Type II Diabetes, Asthma, and Myocardial Infarction (by ICD9 codes):

| | Non-Deduplicated | Deduplicated | % Reduction |
|-----------------------|------------------|--------------|-------------|
| Type II Diabetes | 135,779 | 103,177 | 24.0% |
| Asthma | 110,640 | 79,563 | 28.0% |
| Myocardial infarction | 6,049 | 5,384 | 10.9% |

The Chicago HealthLNK (IV) – Why? (Kho-Cashy-. . . , 2015)

Numbers of patients identified with Type II Diabetes, Asthma, and Myocardial Infarction (by ICD9 codes):

| | Non-Deduplicated | Deduplicated | % Reduction |
|-----------------------|------------------|--------------|-------------|
| Type II Diabetes | 135,779 | 103,177 | 24.0% |
| Asthma | 110,640 | 79,563 | 28.0% |
| Myocardial infarction | 6,049 | 5,384 | 10.9% |

→ essential for city-scale epidemiology

The Chicago HealthLNK (IV) – Why? (Kho-Cashy-. . . , 2015)

Numbers of patients identified with Type II Diabetes, Asthma, and Myocardial Infarction (by ICD9 codes):

| | Non-Deduplicated | Deduplicated | % Reduction |
|-----------------------|------------------|--------------|-------------|
| Type II Diabetes | 135,779 | 103,177 | 24.0% |
| Asthma | 110,640 | 79,563 | 28.0% |
| Myocardial infarction | 6,049 | 5,384 | 10.9% |

- ~> essential for city-scale epidemiology
- ~> at finer-grained geography, can improve intervention targeting

\pause

Theory \rightsquigarrow *Practice*

(Some) Types of Market Design Interventions

- 1 Marketplace Mechanism (Re-)Design
- 2 Information Provision
- 3 (Re-)Shaping the Extensive Margin
- 4 Market Creation

(Some) Types of Market Design Interventions

- 1 Marketplace Mechanism (Re-)Design
- 2 Information Provision
- 3 (Re-)Shaping the Extensive Margin
- 4 Market Creation

(Some) Application Domains (Citations NOT exhaustive!!)

- **Adoption** (Slaugh–Akan–Kesten–Ünver, 2016)
- **Food Banks** (Prendergast, 2016)
- **Healthcare** (Lindau *et al.*, 201*; MANY TODAY)
- **Teacher Allocation** (Featherstone, 2014; Davis, 2017)
- **Youth Employment** (Gelber–Isen–Kessler, 2016)
- **Labor Markets** (Pallais, 2014; Stanton–Thomas, 2016)
- **Sustainability** (Hepburn–Teytelboym, forth.)
- **Immigration** (Weyl, forth.)
- **Public Housing** (Leshno, 2015; Thakral, 2016; Arnosti–Shi, UP NEXT)
- **Development** (Hussam–Rigol–Roth, AFTER THAT)

Conclusion

*“Something there is that doesn’t love a wall,
That wants it down.” [...]*

Conclusion

*“**[The market]** there is that doesn't love a wall,
That wants it down.” [...]*

Conclusion

*“[The market] there is that doesn’t love a wall,
That wants it down.” [...]*

→ *We have many opportunities to design
markets “4” social good, QED!*

Conclusion

*“[The market] there is that doesn’t love a wall,
That wants it down.” [...]*

→ *We have many opportunities to design
markets “4” social good, QED!*

`\end{talk}`

Index

1 Good Markets (Really Do) Make Good Neighbors

- Introduction
- Introduction to Market Design
- Typology of Applications
- Case Studies
- Refugee Resettlement
- Health Data Exchange
- Wrap
- QED