Markets and Marketplaces: Making Markets Work

Congressional Briefing
April 18, 2017

Al Roth, Stanford University
Who Gets What — and Why

Who Gets What

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ALVIN E. ROTH

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Markets and marketplaces are ancient human artifacts, like languages.

And just as there are many natural languages, there are many kinds of markets and marketplaces.
Not all markets are commodity markets.
NY Stock Exchange
Matching markets

• In many markets, you care who you are dealing with, and prices don’t do all the work
• (In some matching markets, we don’t even let prices do any of the work...)
Stanford doesn’t raise tuition until just enough applicants remain to fill its seats

You can’t just show up for work at Google, you have to be hired...
Matching markets are markets in which you can’t just choose what you want (even if you can afford it)—you also have to be chosen.
Many markets fall in between pure commodity markets and pure matching markets

• New technologies make new kinds of markets possible
Matchmaking

New markets for traditional matchmaking

Newer dating apps

- Tinder
  - Swipe left or right
- Bumble
  - The woman makes the first move, 24 hour window
- The Relationship App
- eHarmony
- Coffee Meets Bagel
Other kinds of matchmaking
What do marketplaces do?

Airbnb, for example

• **Thickness**
  • Initially, Airbnb bought competitive rival web sites to get hosts and travellers (e.g. Crashpadder in England)
  • Now competitors are hotels
  • e.g. Capitol Hill Hotel

• **Congestion**
  • Think of how much less convenient a hotel would be if you could only inquire about one room at a time...

• **Trust and Safety**
Matching Markets I’ve helped design:

• Medical labor markets
  • Medical Residents in the U.S.: National Resident Matching Program (NRMP)

• School choice systems: (no money changes hands, but preferences are important...)
  • New York City, Boston; Denver, New Orleans, Newark, Washington DC, Camden
  • Indianapolis coming next year

• Kidney exchange
Kidney exchange--background

- Many more people need kidney transplants than there are available organs.
- The waiting list in the US has more than 100,000 people
  - The wait can be years, and many die while waiting.
  - Recently about 12,000 transplants/year from deceased donors
Living donation, and exchange

- Transplantable organs can also come from living donors.
  - In recent years we’ve had about 6,000 transplants a year from living donors in the U.S.
- Sometimes donors are incompatible with their intended recipient.
- This opens the possibility of exchange.
Simple two-pair kidney exchange

Donor 1
Blood type A

Recipient 1
Blood type B

Donor 2
Blood type B

Recipient 2
Blood type A
By law, no money changes hands

Section 301, National Organ Transplant Act (NOTA),

42 U.S.C. 274e 1984:

“it shall be unlawful for any person to knowingly acquire, receive or otherwise transfer any human organ for valuable consideration for use in human transplantation”.

17
Charlie W. Norwood Living Organ Donation Act
Public Law 110-144, 110th Congress, Dec. 21, 2007

• Section 301 of the National Organ Transplant Act (42 U.S.C. 274e) is amended-- (1) in subsection (a), by adding at the end the following:
  
  • ``The preceding sentence does not apply with respect to human organ paired donation.''
  

Repugnance

• Let’s call a transaction repugnant if some people want to engage in it, and others don’t think they should be allowed to.

• When you see something that is illegal just about everywhere in the world, you have to take it seriously.

• Kidney exchange is a way of taking seriously the repugnance to paying for kidneys.
  • Kidney exchange is a matching market in which kidneys aren’t bought and sold
Congestion: 2-way exchange involves 4 simultaneous surgeries (January, 2006)
Chains initiated by non-directed (altruistic) donors

Non-directed donation before kidney exchange was introduced

Wait list

Non-directed donor
Chains initiated by non-directed (altruistic) donors

Non-directed donation before kidney exchange was introduced:
- Wait list
- Non-directed donor

Non-directed donation after kidney exchange was introduced:
- Non-directed donor
- R1
- D1
- R2
- D2
- Wait list
A better picture

Rare 6-Way Transplant Performed

Donors Meet Recipients

March 22, 2007

BOSTON -- A rare six-way surgical transplant was a success in Boston.

NewsCenter 5's Heather Unruh reported Wednesday that three people donated their kidneys to three people they did not know. The transplants happened one month ago at Massachusetts General Hospital and Beth Israel Deaconess.

The donors and the recipients met Wednesday for the first time.

Why are there only 6 people in this picture?
Simultaneity congestion: 3 transplants + 3 nephrectomies = 6 operating rooms, 6 surgical teams...
Simultaneous cycles and Non-simultaneous extended altruistic donor (NEAD) chains

Conventional cycle

Non-simultaneous chain

Since NEAD chains can be non-simultaneous, they can be long

A Nonsimultaneous, Extended, Altruistic-Donor Chain


SUMMARY

We report a chain of 10 kidney transplantations, initiated in July 2007 by a single altruistic donor (i.e., a donor without a designated recipient) and coordinated over a period of 8 months by two large paired-donation registries. These transplantations involved six transplantation centers in five states. In the case of five of the transplantations, the donors and their coregistered recipients underwent surgery simultaneously. In the other five cases, “bridge donors” continued the chain as many as 5 months after the coregistered recipients in their own pairs had received transplants. This report of a chain of paired kidney donations, in which the transplantations were not necessarily performed simultaneously, illustrates the potential of this strategy.
1 The initiating donor was an unpaired altruistic donor from Michigan.
2 The recipient of Transplant 6 required desensitization to HLA DSA by T and B cell flow cytometry.
3 The recipient of Transplant 9 required desensitization to blood group (AHG titer of 1:8).
Feb 2012, NKR: a NDD chain of length 60 (30 transplants)
KPD and NDD Transplants in U.S.
KPD and NDD as % of LD in the United States
Kidney exchange outside the U.S.

- Monday, February 13, 2017  First kidney exchange in Vietnam
- Wednesday, August 3, 2016  First kidney exchange in Nepal
- March 7, 2016  First paired kidney exchange transplant done in Singapore
- Friday, July 24, 2015  Kidney exchange in Turkey (1st exchanges there)
- April 10, 2015  A first non-directed donor kidney exchange chain in Italy
- March 30, 2015  A first kidney exchange in Argentina at Fundacion Favaloro
- March 5, 2015  First kidney exchange in Poland
- Friday, November 7, 2014  Kidney exchange in Spain: now more than 100 transplants
- June 7, 2014  Kidney exchange in France
- December 19, 2013  Kidney exchange in Vienna
- August 19, 2013  Ten kidney exchange transplants on World Kidney Day in Ahmedabad, India
- July 28, 2013  First Kidney Exchange in Portugal:
- July 23, 2013  Kidney exchange chain in India
- June 6, 2013  Kidney exchange between Jewish and Arab families in Israel
- December 26, 2012  Kidney exchange in Canada
- December 1, 2012  Kidney exchange in India
- June 1, 2012  Mike Rees and Greece: an intercontinental kidney exchange
- March 27, 2012  Kidney exchange in Britain
- February 5, 2012  Kidney exchange in Australia, 2011
- April 29, 2011  First kidney exchange in Spain
- December 8, 2010  National kidney exchange in Canada
- August 3, 2010  Kidney Exchange in South Korea
- Friday, July 30, 2010  Kidney transplantation chain from the Netherlands
The shortage is similar in Europe
Kidneys Transplanted per million population

<table>
<thead>
<tr>
<th>Country</th>
<th>Kidneys Transplanted per million population</th>
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<tbody>
<tr>
<td>U.S.A.</td>
<td>60</td>
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<tr>
<td>Mexico</td>
<td>50</td>
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<td>Philippines</td>
<td>40</td>
</tr>
<tr>
<td>Nigeria</td>
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(Global Observatory on Donation & Transplantation)
Global kidney exchange: a possibility of mutual aid

Two-way exchange

United States

Developing World

Transplants unavailable
First global kidney exchange, with a pair from the Philippines—January 2015, Alliance for Paired Donation (Rees et al.)

Jose Mamaril received a kidney from a non-directed American donor in Georgia. His wife, Kristine, donated one of her kidneys to an American recipient in Minnesota, whose donor continued the chain by donating to a patient in Seattle.

THE BLADE/JETTA FRASER
### PATIENTS

<table>
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<tr>
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<th>Race:</th>
<th>Age:</th>
<th>Insurance:</th>
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<th>Transplant:</th>
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<td>Jan 2015</td>
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<td>Apr 2013</td>
<td>Mar 2015</td>
<td>GA</td>
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<tr>
<td>5</td>
<td>1%</td>
<td>AfricanAmer</td>
<td>36 yo</td>
<td>Private</td>
<td>May 2014</td>
<td>Mar 2015</td>
<td>GA</td>
<td>A</td>
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<td>Mar 2015</td>
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<td>48 yo</td>
<td>Private</td>
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### DONORS

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<tr>
<td>O</td>
<td>Asian</td>
</tr>
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<td>B</td>
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<table>
<thead>
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<td>53 yo</td>
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<tr>
<td>O</td>
<td>29 yo</td>
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<td>B</td>
<td>44 yo</td>
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<td>A</td>
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<td>O</td>
<td>Friend</td>
</tr>
<tr>
<td>B</td>
<td>Friend</td>
</tr>
<tr>
<td>A</td>
<td>Friend</td>
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<td>A</td>
<td>Altruistic</td>
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<tr>
<td>O</td>
<td>Financial</td>
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<tr>
<td>B</td>
<td>Father-in-law</td>
</tr>
<tr>
<td>A</td>
<td>Brother-in-law</td>
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Global Kidney Exchange: Finances

The GKE proposal is “self-financing”.

• Back of the envelope calculation:
  • cost of hemodialysis ≈ $90,000 per year
  • average time under dialysis ≈ 5 years
  • cost of transplant ≈ $120,000 per surgery
    (plus $20,000 in maintenance therapy costs per patient per year)

• So the savings from taking an American patient off dialysis can finance the care of a foreign patient-donor pair.
Jose and Kristine: Safely home...

- $50,000 escrow fund for post-surgical care
Financial flows

• Savings on Dialysis
  • Medicare—complex legislative/bureaucratic
  • Private insurers (33 months)

• New Costs:
  • Surgeries—transplant centers
  • Post surgical treatment in home countries
  • Infrastructure development in home countries

• Self-insuring companies may provide the financial bridge
  • They bear the costs of dialysis
  • They would be glad to see their employees back at work
GKE in the AJT

Brief Communication

Kidney Exchange to Overcome Financial Barriers to Kidney Transplantation

Abstract: Engaging compatible kidney donor–recipient pairs from other countries for participation in a paired kidney exchange program in the United States poses a number of ethical challenges that deserve close scrutiny...
GKE in Mexico: A Bridge of Life
Summary

• There are lots of different kinds of markets and marketplaces
• Prices do all the work in commodity markets, but not in matching markets
• Marketplaces have to help markets achieve thickness, deal with congestion
• As technology changes, new designs are possible
• Markets need rules: these can be supplied both by private parties and by government
  • The useful debate isn’t about “rules and regulations versus no rules,” it is about “what rules are needed for the market to work freely?”
What is a free market?

• “When we speak about a free market, we shouldn’t be thinking of a free-for-all, but rather a market with well-designed rules that make it work well. A market that can operate freely is like a wheel that can turn freely: it needs an axle and well-oiled bearings. How to provide that axle and keep those bearings well-oiled is what market design is about.”
Hayek on market design in *The Road to Serfdom*

• “There is ... all the difference between deliberately creating a system within which competition will work as beneficially as possible and passively accepting institutions as they are. Probably nothing has done so much harm to the liberal cause as the wooden insistence of some liberals on certain rules of thumb, above all the principle of laissez faire.”

• ...

• “The attitude of the liberal towards society is like that of the gardener who tends a plant and, in order to create the conditions most favorable to its growth, must know as much as possible about its structure and the way it functions.”