The Economics of Organ Transplantation

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Outline of the Presentation

- The Organ (Kidney) Shortage
- Causes of the Organ Shortage
- Social Cost of the Current System
- Potential Solutions
- The role of Altruism in the Supply of Kidney for Transplantation
- Why efficient solutions are not implemented

This presentation is based mainly on a preliminary version of a paper with Gary Becker and Karen Ye (2012), Becker and Elias (2007) and Elias (2008).
Persistent excess demand for kidney transplants

Source: United Network for Organ Sharing (UNOS)
Loss of life while waiting

Deaths on the Waiting List

GAP

Average Time on the WL (in years, Second. Axis)

Source: UNOS and own calculations.
Main Cause of the Shortage

Altruistic Supply of Kidney Transplants

Total Cost of Kidney Transplants ($)

$160,000

Annual Gap

Demand for Kidney Transplants

Q_S

Q_0

Annual Quantity of Kidney Transplants
The Cost of the Present System with No Selling of Organs

• Each year 4,000 individuals on the Waiting List die while waiting for a transplant.
• We estimate they forfeit about 15 years of life because they did not get a transplant. At $120,000 a life year, this is worth about $1.8 million to each of the 4,000 who die. After subtracting cost of transplant surgery and adding cost of dialysis, this gives an annual cost of over $7 billion for those who die waiting for transplants.
What to do about it?

• Many discussions of reforms of the present system:

  – Mild
    • Better allocation
    • Donor awareness campaigns and public education
    • Changing the default rule for cadaveric organ donation
    • Priority rules (don’t give don’t take). Donors clubs (Lifesharers)
    • Hidden and in kind compensation
    • Relax the Criteria for the Marginal Donor
    • Kidney Paired Donation

  – More Radical
    • Market solution. Pay for organs
Changing the default rule for cadaveric organ donation

• An important policy proposal to boost cadaveric organ donations is to shift the default rule for cadaveric organ donations. In the United States, as in Great Britain, Germany and other countries, cadaveric organs are procured under the informed consent (opt in) principle. However, in most European countries cadaveric organ procurement is carried out under the presumed consent (opt out) principle, so that organs from cadavers can be harvested unless individuals prior to death expressly indicated that they did not want their organs harvested.
Kidney Paired Donation

Source: WSJ online.
When there are many incompatible pairs (recipient-live donor), the question becomes: What is the best way to assign (exchange) them?

Source: WSJ online.
Kidney Paired Donation

Source: WSJ online.

Kidney Paired Donation

Source: WSJ online.

Market Solution

• Becker and Elias, 2007
  – Monetary incentives could increase the supply of organs sufficiently to eliminate the large queues.
  – These incentives would not raise the cost of transplants by a large percent, and would eliminate waits, raise life quality, and greatly cut deaths.
Components of the Price of an Organ

- Value of Life
  - Monetary Compensation for the Risk of Death
    - Risk of Death * Value of Life

- Quality of Life
  - Monetary Compensation for the Risk of Reducing Quality of Life
    - Risk of Reducing QL * Value of the Reduction in QL

- Forgone Earnings
  - Monetary Compensation for Time Lost during Recovery
    - Time to Recover * Value of Time
## Value of Life Component of the Price

<table>
<thead>
<tr>
<th>Component</th>
<th>Risk of Death</th>
<th>Value of Life</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>1/1000</td>
<td>$5,000,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Liver</td>
<td>1/300</td>
<td>$5,000,000</td>
<td>$16,700</td>
</tr>
</tbody>
</table>
## Price of Kidneys and Livers

<table>
<thead>
<tr>
<th></th>
<th>Value of Life</th>
<th>Quality of Life</th>
<th>Forgone Earnings</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>$5,000</td>
<td>$7,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>$16,700</td>
<td>$15,000</td>
<td></td>
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</table>
# Forgone Earnings Component of the Price

<table>
<thead>
<tr>
<th></th>
<th>Weeks for Recovery</th>
<th>Value of Time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kidney</strong></td>
<td>4 weeks</td>
<td>$675 per week</td>
<td><strong>$2,700</strong></td>
</tr>
<tr>
<td><strong>Liver</strong></td>
<td>8 – 9 weeks</td>
<td>$675 per week</td>
<td><strong>$6,000</strong></td>
</tr>
</tbody>
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## Price of Kidneys and Livers

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<tr>
<td><strong>Kidney</strong></td>
<td>$5,000</td>
<td>$7,500</td>
<td>$2,700</td>
<td>$15,200</td>
</tr>
<tr>
<td><strong>Liver</strong></td>
<td>$16,700</td>
<td>$15,000</td>
<td>$6,000</td>
<td>$37,600</td>
</tr>
</tbody>
</table>
Sale of Organs

The equilibrium price would be set by live donations, which are the marginal donations.
Equilibrium Price of the Cost of Kidneys

- The equilibrium price would be set by live donations, which are the marginal donations. Rough estimates in our earlier paper indicate that the supply of live donations would be quite elastic at a price of about $15,000 per kidney. That estimate clearly has a sizable error—perhaps the price is as high as $25,000 or as low as $5,000. In each case, it does not affect the fundamentals of the analysis.
The role of Altruism in the Supply of Kidney for Transplantation

Most donations are by related individuals, but both giving by unrelated individuals and through kidney exchanges have grown a lot since 2005.
Why efficient solutions are not adopted?

• Even though the benefits of eliminating the organ shortage are significant, many people have opposed proposals to pay for organs on moral and other grounds.

• In reference to the economic analysis of the market for kidney transplants, Paul Bloom, a psychologist of Yale said:
  “the problem is not that economists are unreasonable people, it’s that they’re evil people. They work in a different moral universe.”

• On the ban on organ sale, economist Alvin Roth says: “Legalizing kidney sales faces substantial, perhaps insuperable obstacles. Just as you can’t sell yourself into indentured servitude anymore, some transactions are illegal because enough people find them repugnant.”
Repugnant Transactions

• When certain type of transactions involves money they can be perceived as:
  • Inappropriate
  • Unfair
  • Unworthy
  • Unprofessional

“We didn’t have time to pick up a bottle of wine, but this is what we would have spent.”

(New Yorker cartoon.)
Why efficient solutions are not adopted?

• The concept of Repugnance, developed by Alvin Roth (2007), suggests that some transactions, such as the buy and sale of kidneys for transplantation or to sell horsemeat for human consumption in California, are illegal simply because a sufficient number of people find it repugnant.

• In a repugnant transaction the participants are willing to transact, but third parties disapprove and wish to prevent the transaction.
Why efficient solutions are not adopted?

• However, it can be shown that what is repugnant depends on the circumstances and, moreover, it is closely associated with the social economic costs generated by the ban, or regulation.
• There are many cases in history in which bans or transactions restrictions were removed because of the large social costs of maintaining them.
• Someone might say Americans found drinking alcohol repugnant, so there was a prohibition.
  – 15 years later people changed their mind because the costs of prohibition seemed so high.
• If the price of beef and other meats rose a lot, the repugnance toward horse meat would go down, and might even disappear.
Conclusions

• Organ transplant markets are a disaster
• Large “shortages” of kidneys and other organs for transplantation
• Neither kidney exchanges nor opt out systems have solved the problem of shortages
• Best solution is to allow the purchase and sale of organs
• A market in organs would eliminate organ shortages and thereby eliminate thousands of needless deaths because of organ shortages
Conclusions

• There may be a taste factor that makes one repelled by the sale of organs, but that has to be balanced against the benefits from sale.
• Someone who is repugnant toward selling organs will change his mind if his wife or child suddenly needed one, and she would suffer a lot or even die because of the wait required under a system.
• Conclusions about the morality of using prices to encourage supply or ration demand have changed in the past when they were shown to be effective.
• One example is a carbon tax to cut pollution; another is the use of willingness to pay to reduce the risk of death to measure the (statistical) value of life.
References

- Hippen, Benjamin, Lainie Friedman Ross and Robert M. Sade, MD “Saving lives is more important than abstract moral concerns: financial incentives should be used to increase organ donation,” Ann Thorac Surg. 2009 October; 88(4): 1053–1061.