Sorting, Choice Premium, and Efficiency in the Collection of Blood Donations: Experimental Proposal

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Levine-Mattozzi Reading Group

The Economic Problem of Eliciting Blood Donations

- ▶ Supply with human blood is a **public good problem**
  - ▶ Cannot be generated artificially
  - ▶ Voluntary provision not always enough
  - ▶ Likely increasing demand (demography, medical technology)

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  - ▶ Negative selection
    - ▶ Overtaken by screening technology in high-income countries
  - ▶ Crowding out of non-remunerated, voluntary donations
    - ▶ Open empirical question

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        - ► Open empirical question

- ► Heavy-handed **regulation**
    - ► WHO and EU recommendations against payment
    - ► Only 1.8 percent of global donations reported as "paid" Map
    - ► Germany: Notable exception that allows cash payments

Our Proposal

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- ► Our proposal: A market design that allows donors to **sort** into different **incentive schemes**

- ► Our question: Are there efficiency gains from a dual market?
  - ► We suggest a **theoretical framework** to formulate predictions
  - ► We propose an **experimental design** to test them

Overview of the Presentation

1. Introduction

2. Literature

3. Theory
  - Benabou & Tirole 2006
  - Model of Blood Donations

4. Experimental Design

5. Conclusion

Literature

- ► Public good contributions and altruism

  - ► *Theory*: Andreoni (1989,1990); Levine (1998); Andreoni & Bernheim (2009); Benabou & Tirole (2002, 2006); Bodner & Prelec (2003)

  - ► *Evidence*: Gneezy & Rustichini (2000); Ariely, Bracha, & Meier (2009); Dreber, Levine, Fudenberg, & Rand (2014)

  - ► *Blood donations*: Titmuss (1971); Goette & Stutzer (2008); Lacetera & Macis (2013); Lacetera, Macis, & Slonim (2012, 2014); Mellstrom & Johannesson (2008); Stutzer, Goette, & Zehnder (2011); Niessen-Ruenzi, Weber, & Becker (2015)

- ► Benabou & Tirole (2006)

  - ► First theoretical framework that explains crowding out due to remuneration, interaction with image concerns (including warm-glow)

- ► Ariely, Bracha, & Meier (2009)

  - ► Test in the lab the effect of social image on intensity of donation through a real effort task

Benabou & Tirole 2006

- ▶ Agents are motivated to make a contribution $a = \{0, 1\}$ by
  - ▶ **Intrinsic** incentives (pure altruism)
  - ▶ **Extrinsic** incentives (fringe or monetary benefits)
  - ▶ **Image** concerns (to appear altruistic and not greedy)

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- Agents in the economy can exhibit heterogeneous response to different incentives

- We focus on heterogeneity in response to intrinsic incentives and image concerns

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Utility of an agent:

$$U(a, y) = (v_a + v_y y - c)\, a + \tilde{x}\, [\gamma_a E(v_a \,|a, \tilde{y}) - \gamma_y v_y]$$

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► Valuation for **contributing to social good**

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▶ Extent to which an agent is image concerned

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▶ Reputational payoff

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► Valuation for **money**
  ► We focus on $v_y = 1$

Benabou & Tirole 2006

Decision to Donate

When do agents of different image concerns donate?

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$$U(a = 1, \tilde{y}) = \gamma_a E(v_a | 1, \tilde{y}) - \gamma_y$$

- Nobody ever turns money down...
- ...and the German Red Cross closes business

From Benabou and Tirole to Blood Collection

We suggest a change in the remuneration of the agent.

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- Utility from donating becomes

$$U(a,y) = (v_a[B-y] + y - c)a + \tilde{x}[\gamma_a E(v_a|a,y) - \gamma_y]$$

Model of Blood Donations
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- Yay for the German Red Cross

Hypotheses

The theoretical framework produces two predictions to take to the lab:

Hypothesis 1

*A dual market **lowers average cost of collection** and **increases participation**.*

Hypothesis 2

*When contributions are made in public, a dual market **further lowers average cost of collection** and **increases participation** by means of warm glow.*

Experimental Framework

- ▶ Why an experiment?
    - ▶ Exclude confounders
    - ▶ We explored empirical analysis but hit data constraints
    - ▶ Evidence for donations that pro-social behavior in the lab correlates with pro-social behavior in the field (Benz & Meier 2009)

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- ▶ Aim to reproduce in the lab four aspects of donation problem
  1. Active decision to participate
  2. Value of public good generated with a real effort task
  3. Monetary incentives can decrease the value of donations
  4. Actual donation to charity

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- ▶ Implementation **online** and in the **lab** [Illustration]
  - ▶ Prediction 1 (*private* condition): Test on Amazon Mechanical Turk
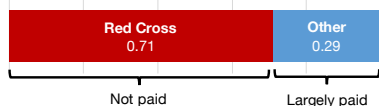 - ▶ Prediction 2 (need to *vary observability*): Bologna BLESS lab

Conclusions

- ▶ Results so far:
  - ▶ We make a modest market design proposal based on the idea of second-order price discrimination for blood collectors
  - ▶ We produce an experimental design to test our hypotheses and successfully ran a pilot <small>Results</small>

- ▶ Next steps:
  - ▶ Test prediction of sorting in the private condition (on mTurk, before the Second-Year Forum)
  - ▶ Test the second prediction of higher participation and higher likelihood of going unpaid in public condition (in the Bologna lab)
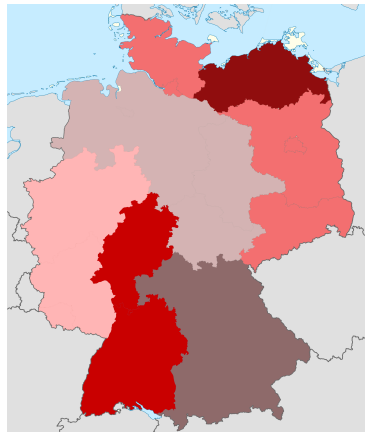
Thank You!

German Blood Market: Institutional Environment

Market Share, by Number of Donations (2014)

Red Cross 0.71	Other 0.29
Not paid	Largely paid

German Red Cross, 6 Independent Organizations

- ▶ Institutional environment makes empirical study difficult
  - ▶ Government data not at. donor level
  - ▶ German Red Cross consists of quasi-independent bodies...
  - ▶ ... none of which want to cooperate
  - ▶ Hospitals very willing to cooperate, but do not have centralized data

- ▶ Even if we had the data, not clear that we could identify crowding-out
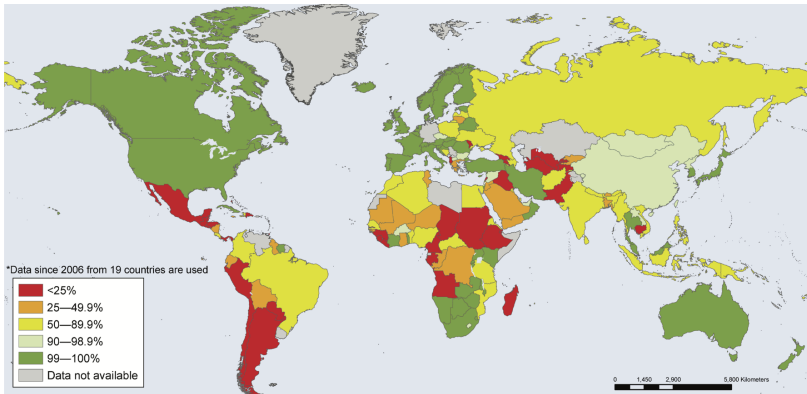 - ▶ Spatial competition varies by region

◁ Back

Global Blood Supply, by Remuneration

- ▶ 1.5m of 83m (1.8%) donations reported to WHO are paid (2012)
  - ▶ Family/replacement donations explains much of the low share of unpaid
  - ▶ Problems with this data

Percentage of Voluntary Unpaid Blood Donations (2008)

*Data since 2006 from 19 countries are used

■	<25%
■	25—49.9%
■	50—89.9%
■	90—98.9%
■	99—100%
■	Data not available

◁ Back

Global and German Blood Supply, Cost, and Safety

- ► Supply
  - ► Global supply of whole blood is roughly 100 million units per year, at 450 milliliters per unit (World Health Organization, 2011)
  - ► In Germany, about 4.5 million units were collected in 2014, making it the fifth-largest market in the world (Paul-Ehrlich-Institut, 2015)
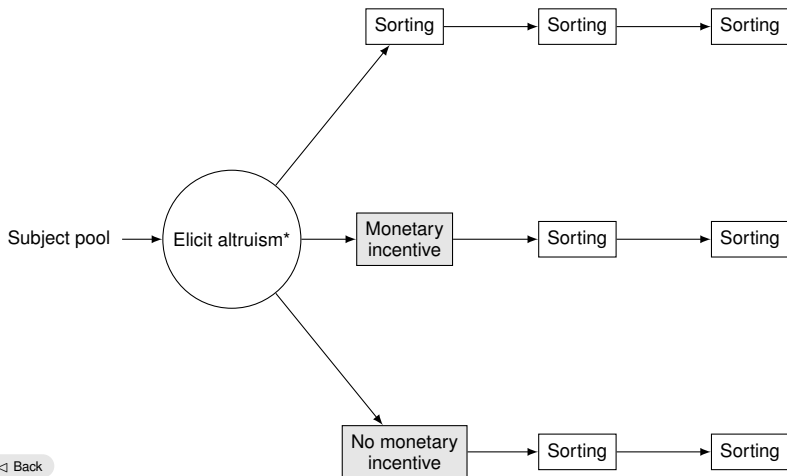
- ► Safety
  - ► Germany one of the first countries in the world to implement nucleic acid testing (NAT) for Hepatitis B, Hepatitis C and HIV-1.
  - ► Residual risk for Hepatitis C (HCV), per million donations: 0.1 in France, 0.18 in Germany, 0.87 in the United States, 1.1 in Italy, 2.33 in Spain (Offergeld et al, 2005; Stramer, 2007)

- ► Cost
  - ► In Germany on average, one blood unit sells at US$ 110. In Sweden and Switzerland at about US$ 190 (Trimborn, 2009)
  - ► In the United States on average, one blood unit sells at US$ 210 (Toner et al., 2011)
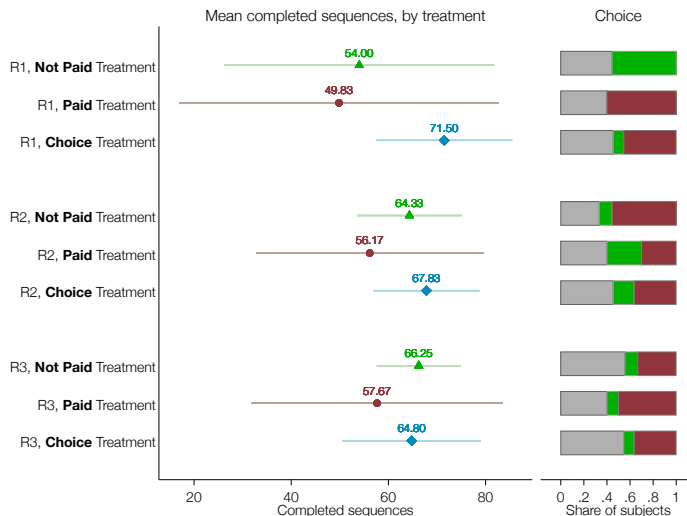
◁ Back

Experimental Design: Private Action

Results: Combined Intensive and Extensive Margin

Total Completed Sequences, by Treatment and Round

Legend:
- Treatment: Not paid
- Treatment: Paid
- Treatment: Choose

More detail
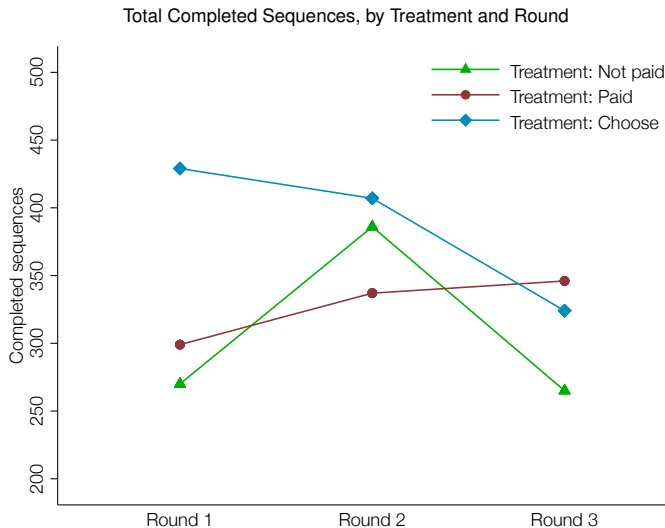
Sequences and Choice, by Treatment and Round

Mean completed sequences, by treatment

R1, **Not Paid** Treatment	54.00
R1, **Paid** Treatment	49.83
R1, **Choice** Treatment	71.50
R2, **Not Paid** Treatment	64.33
R2, **Paid** Treatment	56.17
R2, **Choice** Treatment	67.83
R3, **Not Paid** Treatment	66.25
R3, **Paid** Treatment	57.67
R3, **Choice** Treatment	64.80

Completed sequences

Choice

Share of subjects

◁ Back   Summary Statistics Subject Choice   Summary Statistics Keystrokes

Experimental Subject Choices, by Treatment

Frequency of Choice, by Treatment and Round

Choice	Period 1			Period 2			Period 3		
	Not paid	Paid	Skip	Not paid	Paid	Skip	Not paid	Paid	Skip
Treatment: Not paid	5		4	1	5	3	1	3	5
Treatment: Paid		6	4	3	3	4	1	5	4
Treatment: Choose	1	5	5	2	4	5	1	4	6
Total	6	11	13	6	12	12	3	12	15

Shares of Choice, by Treatment and Round

Choice	Period 1			Period 2			Period 3		
	Not paid	Paid	Skip	Not paid	Paid	Skip	Not paid	Paid	Skip
Treatment: Not paid	0.56	0.00	0.44	0.11	0.56	0.33	0.11	0.33	0.56
Treatment: Paid	0.00	0.60	0.40	0.30	0.30	0.40	0.10	0.50	0.40
Treatment: Choose	0.09	0.45	0.45	0.18	0.36	0.45	0.09	0.36	0.55

◁ Back   Summary Statistics Keystrokes   Chart Keystrokes and Choice

Summary Statistics on Keystrokes (Intensive Margin)

Keystroke Sequences Completed by Subjects, by Treatment and Round

		Mean	Median	Std. dev.	Min	Max	N
Round 1	*Treatment: Not paid*	54.00	72.00	31.66	1	75	5
	Treatment: Paid	49.83	58.00	41.13	0	98	6
	Treatment: Choose	71.50	74.50	17.44	43	92	6
Round 2	*Treatment: Not paid*	64.33	70.00	13.47	43	79	6
	Treatment: Paid	56.17	65.00	29.20	4	82	6
	Treatment: Choose	67.83	68.00	13.56	50	85	6
Round 3	*Treatment: Not paid*	66.25	68.00	8.81	54	75	4
	Treatment: Paid	57.67	60.50	32.27	0	94	6
	Treatment: Choose	64.80	69.00	16.24	42	82	5

◁ Back   Summary Statistics Choice   Chart Keystrokes and Choice