

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
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 - ▶ Open empirical question

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 - ▶ Crowding out of non-remunerated, voluntary donations
 - ▶ 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 and 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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$$U(a, y) = (v_a + v_y y - c) a + \tilde{x} [\gamma_a E(v_a | a, \tilde{y}) - \gamma_y v_y]$$

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- Valuation for **contributing to social good**

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- Visibility of actions

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- Reputational payoff

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- ▶ Valuation for **money**
 - ▶ We focus on $v_y = 1$

Benabou & Tirole 2006

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When do agents of different image concerns donate?

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- ▶ 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

- ▶ At cost c for herself, an agent can generate for the blood collector a value $B > c$
- ▶ Any remuneration y , is paid for from the generated value B
- ▶ Utility from donating becomes

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

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$$E(v_a | 1, \tilde{y} = 0) > E(v_a | 1, \tilde{y} = y) > E(v_a | 0)$$

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

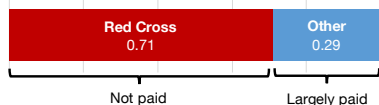
- ▶ Results so far:
 - ▶ We make a modest market design proposal based on the idea of second-order price discrimination for blood collectors
 - ▶ We produce an experimental design to test our hypotheses and successfully ran a pilot Results

- ▶ 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)



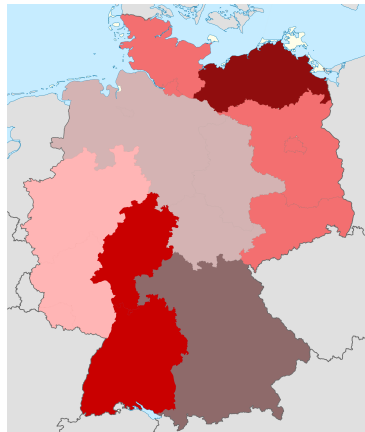
German Blood Market: Institutional Environment

Market Share, by Number of Donations (2014)



- ▶ 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

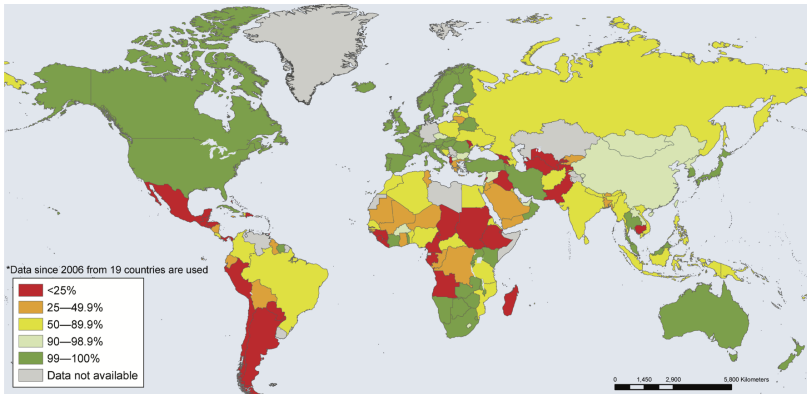
German Red Cross, 6 Independent Organizations



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)



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)

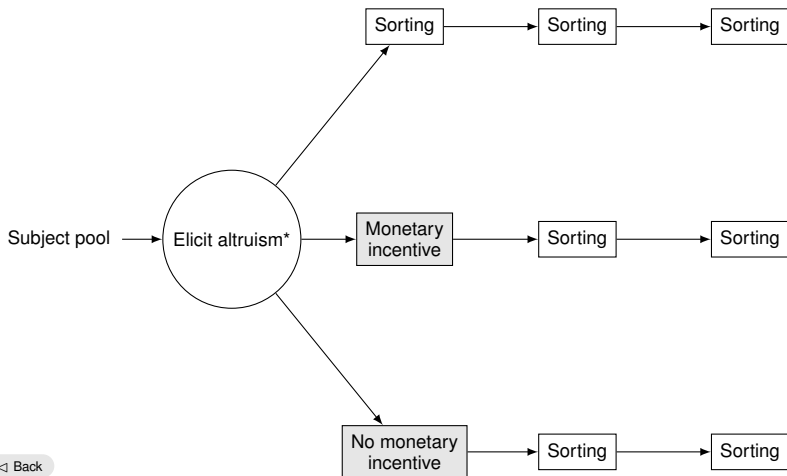
► Safety

- 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)

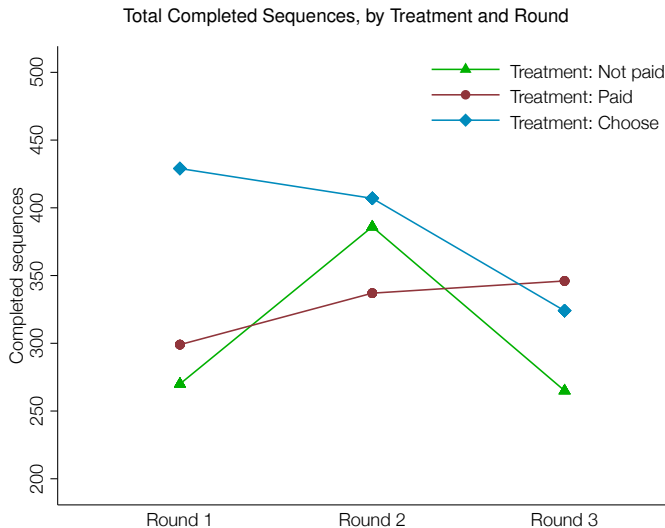
► Cost

- 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)

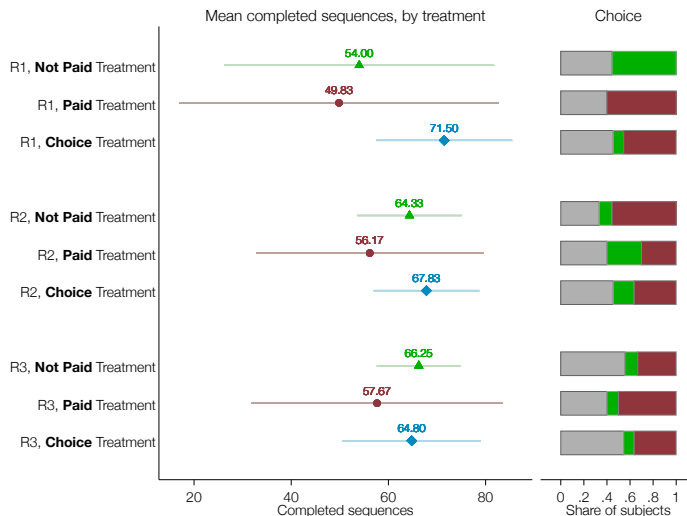
Experimental Design: Private Action



Results: Combined Intensive and Extensive Margin



Sequences and Choice, by Treatment and Round


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[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
<i>Treatment: Not paid</i>	5		4	1	5	3	1	3	5
<i>Treatment: Paid</i>		6	4	3	3	4	1	5	4
<i>Treatment: Choose</i>	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
<i>Treatment: Not paid</i>	0.56	0.00	0.44	0.11	0.56	0.33	0.11	0.33	0.56
<i>Treatment: Paid</i>	0.00	0.60	0.40	0.30	0.30	0.40	0.10	0.50	0.40
<i>Treatment: Choose</i>	0.09	0.45	0.45	0.18	0.36	0.45	0.09	0.36	0.55

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[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	<i>Treatment: Not paid</i>	54.00	72.00	31.66	1	75	5
	<i>Treatment: Paid</i>	49.83	58.00	41.13	0	98	6
	<i>Treatment: Choose</i>	71.50	74.50	17.44	43	92	6
Round 2	<i>Treatment: Not paid</i>	64.33	70.00	13.47	43	79	6
	<i>Treatment: Paid</i>	56.17	65.00	29.20	4	82	6
	<i>Treatment: Choose</i>	67.83	68.00	13.56	50	85	6
Round 3	<i>Treatment: Not paid</i>	66.25	68.00	8.81	54	75	4
	<i>Treatment: Paid</i>	57.67	60.50	32.27	0	94	6
	<i>Treatment: Choose</i>	64.80	69.00	16.24	42	82	5

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